The Rock-afire Explosion

Service Manual

CREATIVE ENGINEERING INCORPORATED

ROCK-A-FIRE EXPLOSION

SERVICE

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This manual will provide you with the necessary information in order to maintain and service your Rock-A-Fire Explosion Show for years to come. The manual is divided up into five main parts. Each part may be considered as a unit in itself with occasional references being made to other parts of the manual. All the necessary diagrams, charts, schematics, drawings and instructions are contained in this manual. For ordering parts, please refer to Part 1, pages 1-015 thru 1-017. All part numbers are available in the "Parts Catalog".

It should be noted that the Trouble-Shooting Guides are designed to be used by experienced technicians who are familiar with the operation of the system.

Our approach to this manual is one that assumes that the show was installed correctly and has functioned correctly for a period of time. We do not intend to deal with improper installation, nor modifications made to the system outside of instructions from Creative Engineering Inc.

The Trouble-Shooting Guide is meant to be read in a descending order until you find the exact cause of the problem and make the necessary corrections. Find the symptom that best describes the problem you are experiencing. Begin in the left column with the first step and move down the numbered steps for each procedure. The right column will give you the location for more detailed information, as well as anticipated results. If the problem is not corrected after each step is completed, move to the next step.

The repair section contains a more detailed account on the methods of repair and maintenance. If at any point you do not feel that you have a good grasp of the information from the Trouble-Shooting Guides, then turn immediately to the repair section for a further explanation.

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Actuation Levers: A front mount lever of the air cylinder that moves during the cylinder action.

Adjustment Tape: V.C. tape.

Aircraft bolt: A gold anodized bolt with a long shaft and fine threads, used where a cylinder's front mount rod end joins with a flanged block. An example is, the head-left-right cylinder's front mount.

Air Dryer: The part of the air system located down line from the storage tank. It removes the moisture from the air.

Air Regulator: An adjustable device that controls air pressure flowing through it.

Amps: Amplifiers

Barb fitting: The fitting used to attach air lines to other devices.

BD: Bottom drawer

Blow by: A type of air leakage where the air escapes past a seal.

Brass Washer: Composed of brass and gold in color. It is a commonly used as a thrust bearing. One place it is used is between the upper neck and lower neck shaft.

C.C. Panel: The original light control panels consisting of Eight and Twenty Triac lighting control boxes.

C.F.M.: Cubic feet of air per minute. The show consumes, at full speed, approximately 95 cfm. at 80 psi.

C.L.: Colored overhead stage Lights

Clevis nut or Jam Nut: A standard thread size nut but constructed thinner, used for locking threaded devices.

Collar Pin: A collar pin is a custom pivot pin used in high stress areas. In particular, it is used in the rear mount of a cylinder.

Controller: Gray box controller sometimes called a "computer"

Convenience outlet: A specific electrical outlet located on the back wall of the platform.

Cosmetics: The cosmetic aspect of the show is concerned with the outward appearance of the show and all that is involved in making it look correct.

Critical Adjustment: Those adjustments that must be made, with pre-determined dimensions, for either aesthetic or mechanical reasons for the best operating conditions of a movement.

C.S.: Center Stage

Curtain Control Board: Drapery Control Board used to open and close the draperies.

Cylinder bore: The inside diameter of a cylinder.

Distribution Manifold: An air manifold that distributes air from the main air line into the smaller air lines which control characters and movements.

Down (critical) Show: A show is deemed critical or down, if the loss of function is obviously distracting from the enjoyment of the show.

Dual Pressure Regulator: Is an electrically controlled mechanism that shifts the air pressure from one pressure level to another pressure level. Abbreviated: DPR.

'E' Hinge: A hinge constructed in the shape of a 'E'. These are used in the head-up-down mechanism.

"Electronimation"™ : The term coined by Creative Engineering Inc. to describe the combination of electronic and mechanically controlled animated objects.

Fas-pin: A fastener type pin that is easily removable due to it's construction. This pin is used in cylinder front and rear mounts. It is held in position by a ball detent.

Finger contacts: The pins on the printed circuit card edge connector.

Flow Control: A metering device that adjust the volume of air coming out of the cylinder. It meters the flow in one direction and allows free flow in the other direction.

FUM: Female uni-mount hinge used in elbows and other similar positions.

Ground Thrust Washer: A thin flat washer with smooth sides and edges that goes into an assembly of two hinges. It reduces the friction on the materials that it separates.

H.L.: House lights

'K' Hinge: A hinge constructed in the shape of an 'K', used in the shoulder assembly.

Large 'C' Hinge: Constructed in the shape of a 'C' and is used in the pelvis.

Light Control Module: Located inside the RAF 100 Box is a small Printed Circuit board that controls both lights and other external devices, such as draperies, (CEI Board).

Limit Switch: Switches that can adjust the number of revolutions a motor will travel, thus setting the traveling distance of the draperies. These are located on the Drapery Motor unit.

Load Washer: A thin bent washer used in hinge points and other positions used to help reduce friction and provide spacing.

Lubricator: An in line oil mist lubricator for the air line system that is located between the distribution manifold and the valve bank.

Manual override: Manual overrides are located in various positions throughout the system; on valves, air compressor, controller dual p.c. mount, wall switches, and even the House Light Dimmer Board itself. (Take care to identify in which section your override is needed).

Muffler: The aluminum box filled with foam used to muffle the noise of the air exchange.

MUM: Male uni-mount used specifically in Beach Bear leg kick.

Needle Bearing: This is a high quality bearing used in high stress areas. Note: It must be used with hardened pins.

Opto, Opto-isolator : Optically coupled intergrated circuit.

O'scope: Oscilloscope

Pillow Block Bearing: A bearing with a cast base and two holes for mounting. It is commonly used in the Beach Bear guitar rock and body-turn movement.

Pinch roller, capstan, heads: Parts of the Tape Deck (refer to the manual on the Tape Decks).

Pin To Pin: This gives the dimension between the center of the front cylinder mount hole and the center of the rear cylinder mount hole.

Pin up or jumper bit: The action of attaching a jumper wire between D.C. ground (0) and +25v D.C. on the collector leg of the transistor of the Long Driver Board.

P.M.: Abbreviation of Preventive Maintenance.

Pots: Potentiometers

Props: Consisting of moving and non moving props. Moving ones are: Sun, Moon, Spider and Baby Bear. Non moving ones are: Organ, Sign, Backdrops, Smitty's Super Service Station, rocks, flowers, etc.

P.S.I.: Pounds per square inch. (Note, the show runs off of both 40 psi. and 80 psi.)

RAF 100: The newer model of light control unit that switches the A.C. circuitry, may be referred to as RAF 100-B. The RAF 100-B refers to the main show.

Receiver: That part of the air system near the air dryer that is actually a storage tank of air.

Rod end: A Rod end is spherical type bearing used in cylinder front mounts.

Roll Pin: A spring action type pin that expands and contracts upon entry.

Self Locking nut: A nut with a plastic insert that creates friction on the bolt, thus, locking it into position. They are typically used on aircraft bolts.

Shuttle Cock: A Dual Pressure System Control valve that allows high air pressure to flow and stops the flow of the low pressure air.

S.L.: Stage Left-on your left as you face the audience, on your right as you face the stage.

Small 'C' Hinge: A hinge constructed in the shape of a 'C'. A common use is in the head-up-down pivot hinge.

Snaps: Snaps are made of three parts; the male, the female, and the grommet. The male snap has a stud and a post. The female snap has a socket and a cap. The grommet just has a socket. The snaps are used to attach various materials together.

Solenoid: Electro magnetic actuator, commonly used to shift air valve spools.

S.R.: Stage right-on your right as you face the audience.

S.E.: Stage Effects lighting.

Stainless Steel Washer: A stainless steel thrust washer. These are used typically in hinge assemblies.

Super Pillow Block Bearing: A re-circulating ball bearing used for linear motion; typically used in Sun, Moon and Looney Bird raise mechanisms.

Sync: Synchronization

Tape Control Board: Show Control Board, a microprocessor controlled real time P. C. card.

TD: Top Drawer

Tolerance: Tolerance is the amount that a measurement may very from its intended value. It is stated on the Critical Adjustment Chart with a (+) or (-) dimension.

Tol-O-Matic Cylinders: A brand name of cable cylinder used in all the mechanical props except Baby Bear.

Valve Bank: A group of air valves connected together to form a unit.

VCR Tape: Video Cassette Recorder Cartridge Tape

VCR: Video Cassette Recorder

VU Meter: The meters on the front of the tape decks

Suggested Tool List

Description: The following is a list of suggested tools, that all Store Technicians will need. Not having the suggested tools will cause replacement of a part that could have been repaired. There is a list of miscellaneous Tools in the Parts Catalog under character supplies, they are the only tools that "Creative Engineering" supplies. The rest of the tools can be purchased through a Department Store or from a tool supplier.

Description
1) Arbor Press
2) Drill Set 1/16" through 1/2", 1/64" Increments
3) Tap Set from #6-32 through 5/16"-18
4) Drill and Tap Chart
5) Work Table Vise
6) Awl
7) 14 Piece Allen Wrench Set, 1/16"-1/2"
8) Needle Nose Pliers
9) Wire Cutters
10) Regular Pliers
11) Channel Locks
12) Vice Grips
13) 6" Combination Square
14) Measuring Tape 3/4" x 12'
15) Replacement Tape 3/4" x 12'
16) 1/8" Drift Punch
17) 3/16" Drift Punch
18) 1/4" Drift Punch
19) 5/16" Drift Punch
20) 3/8" Drift Punch
21) Center Punch
22) 6" Mill File
23) 10" Mill File
24) File Handle
25) Ball Pien Hammer, 8 oz.
26) Plastic Tipped Hammer
27) Flat Screwdriver, 4 Piece Set
28) Phillips Screwdriver, 4 Piece Set

Suggested Tool List

Description

29) Ignition Wrench Set, Open End 10 Piece
30) Combination Wrench, 7/16"
31) Combination Wrench, 1/2"
32) Combination Wrench, 9/16"
33) Combination Wrench, 11/16"
34) Combination Wrench, 3/4"
35) Open End Wrench, 3/8" x 7/16"
36) Open End Wrench, 1/2" x 9/16"
37) Open End Wrench, 17/32" x 7/16"
38) Adjustable Wrench, 10" (Crescent)
39) Chucking Ream, 1/4" .250
40) Chucking Ream, 5/16" .3125
41) Chucking Ream, 3/8" .375
42) Chucking Ream, 1/2" .500
43) Chucking Ream, 5/8" .625
44) "T" Handle (To Hold Reams)
45) Oil Can
46) Electrical Hand Drill With 1/2" Chuck
47) Grease Gun
48) Pocket Screwdriver 1/8" x 2"
49) Nut Driver Set, 7 Piece 3/16"-1/2"
50) Jacobs Chuck
51) Pop Rivet Gun
52) Automatic Wire Stripper
53) Small Needle Nose Pliers
54) Amphenol Hand Crimping Tool
55) Molex Pin Extraction Tool
56) Molex Crimping Tool
57) Air Pressure Gauge with Male Quick Release

TABLE

OF

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<u>Power Up, Down and P.M.</u>

INTRODUCTION

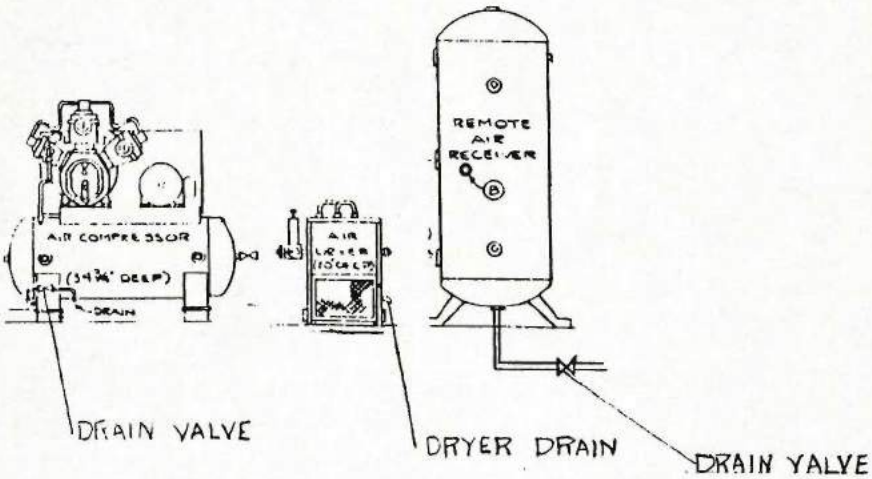
POWER UP AND POWER DOWN PROCEDURES

Description: The animated show is a computer controlled entertainment feature of ShowBiz Pizza Place. Strict adherence to the following Power Up and Power Down procedures is essential.

Contents:

PROCEDURES FOR POWER UP

A. In the compressor room:
   1. Close the drain valves on the Compressor, Air Dryer and Receiver.
   2. Empty the drainage collectors.
   3. Turn on the power to the Compressor and Air Dryer. (Note: Refer to the Air Dryer manual as to constant operation.)
(SEE DRAWING BELOW)



B. In the Control Room, clean the Tape Heads, Guides, Pinch Rollers and the Capstan. To clean these parts use denatured alcohol or a name brand tape head cleaner.

C. Power up the Audio Rack. (NOTE: BE SURE THE AMPLIFIER VOLUME CONTROLS ARE TURNED FULLY COUNTER CLOCKWISE, OR DOWN, BEFORE YOU POWER UP)
   1. Turn on the Equalizer.
   2. Turn on the tape decks.
   3. Turn on the Amplifier, and set the volume controls to the marked levels.

D. Rewind the tape decks #1 and #2.

E. Reset the tape counter to "0000".
   1. Run the tape until a signal first appears on the V.U. meter, channel #4.
   2. Reset the tape counter to "0000".
   3. Rewind the tape counter ten (10) counts, the counter should read "9990".
   4. Reset the tape counter to "0000".

F. At approximately 15 minutes before the restaurant opens.
   1. Push PLAY on the Dual P.C. Mount.
   2. After tape deck #1 stops, turn the "House Light Override Switches" into the "Computer" mode.

POWER DOWN PROCEDURES

A. Turn the House Lights to the Over-ride Mode.

B. Turn all four amplifier volume controls fully counter clockwise and turn off power to the amplifiers.

C. Turn off the Equalizer.

D. Turn off Tape Decks #1 and #2.

E. Turn off all power at panel L3.
   1. Gray Show Controller
   2. Stage Flood Lights
   3. Audio
   4. Stage Effect Lights
   5. Spot Lights
   6. Drape Motors

F. Go to the Compressor room.
   1. Turn off the Air Dryer
   2. Turn off the Compressor

G. Empty all Drainage collectors, and check all drains for blockage. Open the Drain Valves on the Compressor, Air Dryer and Receiver a small amount, these valves will remain open all night.

H. Check the Compressor oil level, if low add Non-Detergent oil, fill to the proper level. (Note: Use 30wt. oil in the colder areas, and 40wt. oil in the warmer areas.)

I. Check the Compressor for any loose components. ie, Belts, Mounting bolts, fittings, etc., tighten any found.

J. If any problems are noted during the day, they are to be documented and left on top of the Controller. This will insure that the person coming in the next day will be aware of any problems, before powering up the show.

K. Be sure the Controller and Compressor room doors are locked. (Please Double Check the Doors)

(Note: Security policy may prohibit leaving the building during night hours. Use the indoor shut off, and do the required steps during power up procedures.)

INTRODUCTION

PREVENTIVE MAINTENANCE

Description: Preventive maintenance (P.M.) is essential for the proper operation of the animated show. Billy Bob and all the gang are counting on you to check them out regularly. If P.M. is performed properly the chances of the show becoming inoperative during open hours is reduced. (Saving you and the audience aggravation) So please read over and follow the Daily, Weekly, Monthly, Quarterly and Semi Yearly P.M. procedures.

Contents:

Page 1-006) Daily P.M., each step included must be COMPLETED every day the show is in operation.

Pages 1-007 and 1-008) Weekly P.M., each step included must be COMPLETED a minimum of once a week.

Page 1-008) Monthly P.M., the 6 steps under monthly P.M. should be spread over the month as time allows. Keep a check list so that each step is COMPLETED once a month.

Page 1-009) Quarterly P.M., these steps are simple and can be done in one day. But they must be COMPLETED once every 3 months.

Page 1-009) Semi Annually P.M., this step is the character rebuilding, the disassembly and reassembly of all the characters. One character can be done over a period of several days, but all the characters Billy Bob, Beach Bear, Fatz, Mitzi, Dook, Rolfe and Earl, Looney Bird,and the props Sun, Moon, Spider and Baby Bear, must be rebuilt every 6 months. Keep a check list, and mark the date the character was completely rebuilt, and in 6 months do it again.

Pages 1-010 thru 1-014) Video Testing Procedures.

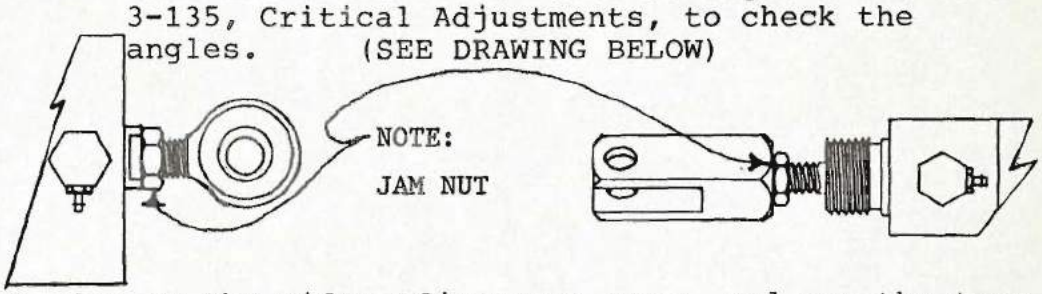
Pages 1-015 thru 1-017) Part Ordering Procedures and Spare Parts List.

Daily P.M.:

A. Check the Air Filter bowl at the Dual Pressure Regulator and drain off any accumulated water. No water should be present at the Air Filter, if water is present, refer to Page 3-005, Step C.

B. Check the lubricators, located at each character's trap door under the stage.
   1. If any water is present, refer to Page 3-005, Step C.
   2. Fill to 3/4 full with 10 wt. Non-Detergent Oil. See page 3-003, step G, for filling instructions.

C. Lubricate, check over and tighten one character daily. Rotate the characters and keep a check list so that all the characters are checked over every 8 days. Do the Sun and Moon on the same day and the Spider and Baby Bear in one day.
   1. Lubricate all hinge points using black C.E.I. lube, e.g. shoulders, waist, neck pivot, etc. (Do Not disassemble the hinges to lubricate)
   2. Lubricate all the Cylinders, Piston Shaft, using black C.E.I. lube. Actuate the cylinders and check for a smooth and complete movement.
   3. Clean any loose fur and, or accumulated dirt from cylinder rods and guide shafts, wipe away any excess grease.
   4. Remove the latex mask and clean the Eye Balls using a Household type cleaner (Fantastic or 409) and a soft clean cloth. Allow the eye ball to dry completely before reattaching the mask.
   5. Check all the welded joints for cracks.
   6. Tighten any loose parts, set screws, shaft collars, cap screws, nuts and bolts.
   7. Tighten all jam nuts on cylinders. If any jam nuts are found loose refer to Pages 3-094 thru 3-135, Critical Adjustments, to check the angles. (SEE DRAWING BELOW)



D. Set up the Video Adjustment tape, and run the tape. Run the character through the show without sound. Listen and watch for movements being out of sync with the Video Display, mechanical defects or Cosmetic binding i.e. air leaks, squeaks, rattles, movements not working, etc. (See Pages 1-010 thru 1-014 Video Testing Procedures and Charts)

E. Verify that the manager is aware of any problems that do exist.

F. If any problems do exist that must be repaired immediately, refer to the Trouble Shooting and, or Repair Parts.

Weekly P.M.:

A. Lubricate the tops of the plastic eyelids, and the eye sockets in the mask, using C.E.I. eyelid lube. (Part #APK 1301) Check the eyelids for any rough spots or wear spots, replace if necessary.

B. During normal grooming of the fur, a blast of air from your air gun will help appearance. Use a wire wig brush only in the areas that are knotted or matted. Check the costumes and masks for any wear spots or rips. Make sure the manager is aware of any problems that do exist.

C. Remove the audio tapes from the tape decks.

D. Using a Demagnetizing tool, demagnetize the tape heads and tape guides. (Note: The Demagnetizing tool will erase the tapes, if it gets near them) Do Not touch the tape heads with the Demagnetizing tool. Pass the end of the tool near the head but don't touch it.

E. Place the audio tapes back onto the tape decks.

F. The characters in the past have been oiled using 10wt. non-detergent oil on the cylinder shafts and at hinge points. The use of such oil has been amended to the use of grease, (C.E.I. lube) available only through Creative Engineering.

G. Check all electrical cables for damaged insulation, loose wires, damaged connectors, etc., repair if needed.

H. Using soapy water, check for air leakage at the valve bank and the distribution manifold. Check the air lines for any deterioration, i.e. cuts, air bubbles, oil damage, etc. If problems exist, refer to Pages 3-002 thru 3-030 The Air System.

I. Check the protective coverings on the character plumbing harness, they may have slipped from their original placement. The coverings should protect the air lines from abrasion on the metal frame, during the complete movement of the character.

J. Remove the leather shoulder and elbow pieces from the characters, rub a small amount of Saddle Soap into the pieces, this will keep them soft and flexible and prolong their use. Remove and replace the leather pieces one at a time. (Do Not get them mixed up, for ease in replacement mark them).

K. The muffler is located at each character's valve bank under the platform. Remove the bolt holding the foam into the aluminum muffler. Oil may have collected inside the muffler, remove the foam and clean it and the muffler using water and a mild soap. Allow the foam to dry completely before reassembling.

L. Make sure all areas around the platform floor lighting and electrical receptacles are free from any debris. Wipe off the light lenses using alcohol and a clean rag, Do Not disassemble the lights to clean, all lighting should be cold before cleaning.

Monthly P.M.:

A. Using the spare parts list, make a inventory of all spare parts and ORDER replacements for any missing parts. (See Pages 1-015 thru 1-017)

B. Clean all the spot lights using alcohol and a soft piece of cloth. (Make sure the lights are cold before cleaning)

C. Clean the compressor room, the compressor and air dryer.

D. Clean the controller room.

E. Wipe down all props with a dampened sponge.

F. Clean and lubricate the drapery motors gear box, and the main drive wheel.

G. Lubricate the drapery track, using silicone lube, place lubrication only on the inside of the aluminum channel. Check the curtain track mounting in the ceiling.

H. Test the lights using the lighting video tape. Replace any blown lamps. Adjust corresponding spot light numbers, to their character positions. See page 1-018 for an illustration of the characters, with the spot light adjustments. The light can be kept on by "Pinning Up" the appropriate bit. (Refer to Electronics Repair, Pages 5-005 and 5-006, and all drawings referred to by that text)

Quarterly P.M.:

A. Compressor P.M.
   1. Turn power off to the compressor.
   2. Check the compressor for oil leaks, if any are found see the compressor service manual, if necessary.
   3. Drain the compressor crank case oil, refill with 30wt. Non-Detergent oil. (Note: Use 30wt. oil in the colder areas, and 40wt. oil in the warmer areas.)
   4. Clean the entire compressor.

B. Tape deck P.M.
   Check the tape Pinch roller for wear and tear. Replace pinch roller and belts if necessary.

Semi Annual P.M.:

A. Remove the head from the character you want to rebuild, first. Then on another day, remove one arm, then the other arm. Do the Chest next, and finally the leg movements.
   1. Label and pull the air lines to the cylinders.
   2. Detach the body part at the easiest location possible.
   3. Check the Hinges and Cylinder mounts, look for sloppy mounts, dry Hinge Points, loose set screws, etc., repair or replace what's needed.
   4. Check the cylinders, look for gasket shavings or a dragging not smooth movement, if a problem is evident rebuild the cylinder. You can rebuild the double acting cylinders and Tol-O-Matic cylinders, but Clippard cylinders cannot be rebuilt.
   5. Disassemble the bad hinges and clean them.
   6. Check all the Needle Bearings and Bushings for wear and tear, replace them if necessary.
   7. Check all Rod Ends, and cylinder mount holes for wear and tear. Repair what problems you can, and note the problems you can't. If you can't repair the problem you may want to order the replacement parts now. Use these noted problems for trouble spots you can check for more carefully during Daily P.M. (Page 1-006)
   8. Reassemble the parts, refer to Pages 3-001 thru 3-093 Part 3, Repair for drawings, and instructions on the individual parts or movements you are working on.

Video Testing Procedures:

A. Locate the video test equipment, at a point where the video display and character to be tested, can be viewed simultaneously.

1. Connect the cable from the audio output #2, on the Tape Deck, to the tape select box, (Front Panel) input channel #3 or #4.

2. The correct input channel is determined by selecting which character is to be stimulated, channel #3 is the top drawer and channel #4 is the bottom drawer. (see Bit, Valve and Movement Charts, Pages 1-011 thru 1-014)

3. Power up the video tape deck.

4. Load the tape and rewind it completely.

5. Set the unit counter to zero.

B. Play the tape and follow the adjustment procedures described below. View the tape long enough to correctly determine that the movement is truly out of adjustment. (Do Not adjust the Flow Control unless you are sure the movement needs adjusting) The video display and character must be synchronized exactly. If a movement is in question:

1. Isolate the valve in the valve bank that operates the movement in question. (see "Bit, Valve and Movement Charts", Pages 1-011 thru 1-014) Manually operate the valve, by pressing the white manual override button on the valve's solenoid.

2. Observe the movement by operating it manually. Look for a smooth operation of the movement in question, check for Cosmetic parts that are binding, if problems are present refer to PART 2 Mechanical Trouble Shooting.

C. After determining that the movement truly does need adjusting, turn the Flow Control Adjustment screw. Remember the air coming out of the cylinder is what you are adjusting. (For a explanation of the air system see Pages 3-002 thru 3-030, The Air System.

Bit, Valve And Movement Charts:

MITZI

Movement	Bit #	Valve #
Mouth	35 BD	1*
Left Ear	26 BD	2 SA
Right Ear	27 BD	3 SA
Left Lid	31 BD	4
Right Lid	32 BD	5
Eyes Left	33 BD	6 SA
Eyes Right	34 BD	7 SA
Head Left	28 BD	8
Head Right	29 BD	9
Head Up	30 BD	10
Left Arm Raise	23 BD	11*
Right Arm Raise	18 BD	12*
Left Elbow	24 BD	13
Right Elbow	19 BD	14
Left Arm Twist	25 BD	15
Right Arm Twist	20 BD	16
Body Twist Left	36 BD	17
Body Twist Right	37 BD	18
Body Lean	38 BD	19*

FATS

Movement	Bit #	Valve #
Mouth	45 TD	1*
Left Lid	41 TD	2
Right Lid	42 TD	3
Eyes Left	43 TD	4 SA
Eyes Right	44 TD	5 SA
Head Left	54 TD	6
Head Right	55 TD	7
Head Tip Left	51 TD	8
Head Tip Right	52 TD	9
Head Up	53 TD	10
Left Arm Swing	57 TD	11
Right Arm Swing	58 TD	12
Left Elbow	59 TD	13
Right Elbow	60 TD	14
Foot Tap	61 TD	15
Body Lean	62 TD	16*

(SA) Single Acting Cylinder
(*) Flow Controls At Cylinder In The Body
(TD) Top Drawer
(BD) Bottom Drawer

Video Testing

Bit Valve And Movement Charts:

BILLY BOB

Movement	Bit #	Valve #
Mouth	46 BD	1*
Left Eye Lid	47 BD	2
Right Eye Lid	48 BD	3
Eyes Left	49 BD	4 SA
Eyes Right	50 BD	5 SA
Head Left	51 BD	6
Head Right	52 BD	7
Head Tip Left	53 BD	8
Head Tip Right	54 BD	9
Head Up	55 BD	10
Left Hand Slide	39 BD	11
Right Arm Raise	56 BD	12*
Right Arm Twist	57 BD	13
Right Elbow Twist	58 BD	14
Right Wrist	59 BD	15
Guitar Raise	40 BD	16
Body Twist Left	61 BD	17
Body Twist Right	62 BD	18
Foot Tap	44 BD	19
Body Lean	63 BD	20*

BEACH BEAR

Movement	Bit #	Valve #
Mouth	16 BD	1*
Left Eye Lid	1 BD	2
Right Eye Lid	2 BD	3
Eye Cross	3 BD	4 SA
Head Left	6 BD	5
Head Right	7 BD	6
Head Up	8 BD	7
Right Arm Raise	11 BD	8*
Right Arm Twist	12 BD	9
Right Elbow Twist	13 BD	10
Right Wrist	14 BD	11
Left Hand Slide	4 BD	12
Guitar Raise	5 BD	13
Left Leg Kick	9 BD	14
Right Leg Kick	10 BD	15
Body Lean	15 BD	16*

(SA) Single Acting Cylinder
(*) Flow Controls At Cylinder In The Body
(TD) Top Drawer
(BD) Bottom Drawer

Video Testing

Bit, Valve and Movement Charts:

ROLFE AND EARL

Movement	Bit #	Valve #
Mouth	1 TD	1*
Left Ear	9 TD	2 SA
Right Ear	10 TD	3 SA
Left Eye Lid	2 TD	4
Right Eye Lid	3 TD	5
Eyes Left	4 TD	6 SA
Eyes Right	5 TD	7 SA
Head Left	6 TD	8
Head Right	7 TD	9
Head Up	8 TD	10
Left Arm Raise	11 TD	11*
Left Arm Twist	12 TD	12
Left Elbow	13 TD	13
Right Arm Raise	17 TD	14*
Right Arm Twist	18 TD	15*
Right Elbow Twist	19 TD	16
Earl Head Tilt	20 TD	17
Earl Mouth	36 TD	18
Earl Eyebrow	37 TD	19
Body Twist Left	14 TD	20
Body Twist Right	15 TD	21
Body Lean	16 TD	22*

DUKE

Movement	Bit #	Valve #
Mouth	30 TD	1*
Left Ear	23 TD	2 SA
Right Ear	24 TD	3 SA
Left Eye Lid	26 TD	4
Right Eye Lid	27 TD	5
Eyes Left	28 TD	6 SA
Eyes Right	29 TD	7 SA
Head Left	25 TD	8
Head Right	21 TD	9
Head Up	22 TD	10
Left Arm Swing	33 TD	11
Right Arm Swing	34 TD	12
Left Elbow	35 TD	13
Right Elbow	31 TD	14
Cymbals	32 TD	15
Base Drum	63 TD	16
Body Lean	64 TD	17*

(SA) Single Acting Cylinder
(*) Flow Controls At Cylinder In The Body
(TD) Top Drawer
(BD) Bottom Drawer

Video Testing

Bit, Valve and Movement Charts:

Looney Bird

Movement	Bit #	Valve #
Mouth	17 BD	1*
Left Eye Lid	41 BD	2
Right Eye Lid	42 BD	3
Eye Cross	43 BD	4 SA
Head Left	21 BD	5
Bird Raise	22 BD	6

Props

Movement	Bit #	Valve #
Sun Mouth	38 TD	1*
Sun Raise	39 TD	2*
Moon Mouth	46 TD	4*
Moon Raise	47 TD	5*
Spider	49 TD	7
Baby Bear	50 TD	8*

(SA) Single Acting Cylinder
(*) Flow Control At Cylinder In The Body
(TD) Top Drawer
(BD) Bottom Drawer

Parts Ordering Procedures:

Description) The following procedures are supplied to coincide with existing procedures. It is provided here simply to restate the procedures.

A. Ordering for a "Critical" or "Down" Show; a show is deemed critical or down if the loss of function is obviously distracting from the enjoyment of the show.
   1. Parts will be ordered through the appropriate chain of command.
   2. Order the critical parts using the telephone number: 305-841-7900.
   3. Do Not follow up the order with a written requisition form.

B. Parts ordering for a Non-Emergency parts;
   1. Order these parts only on form SPP 08 (Electronic Parts/Materials Requisition)
   2. Each requisition will bear the restaurant's stamp and store number and shall requisition parts for 1 character only.
   3. Forward your requisition through the appropriate chain of command to:

      Creative Engineering, Inc.
      778 West Washington Street
      Orlando, Florida 32805
      ATTENTION: Parts Department

C. Returning Electronic Parts: (All electronic parts are exchange prices only)
   1. Upon receipt of a new part, tag the old part with information about how and why the part failed, along with any recommendations.
   2. Ship the part PRE-PAID to:

      Creative Engineering, Inc.
      778 West Washington Street
      Orlando, Florida 32805
      ATTENTION: Parts Return

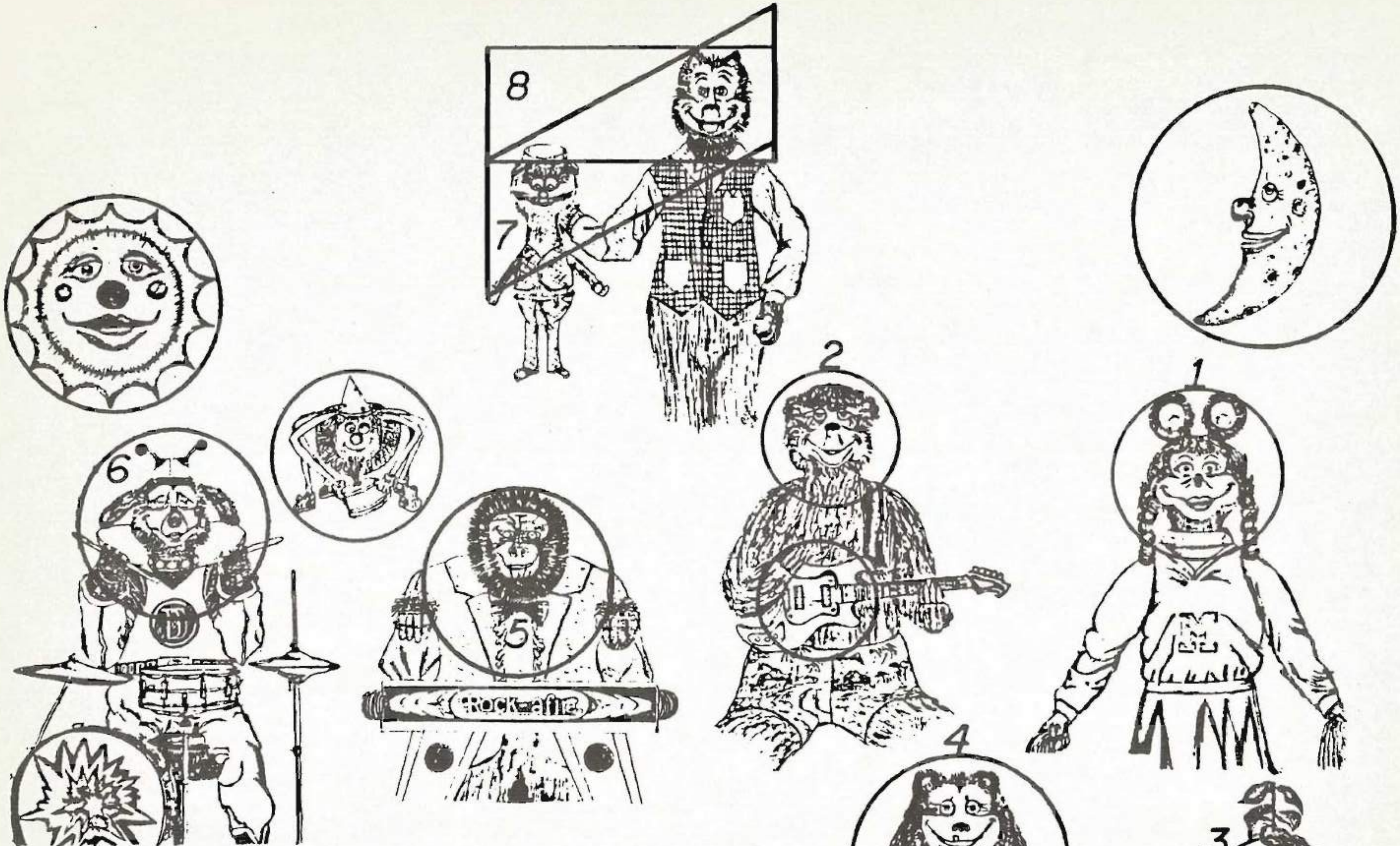
Parts List:

The following is a list of parts to be kept on hand, the parts contained are a recommendation and can be changed to contain your specific needs. Keeping the spare parts inventory up, will reduce down time and possibly make your job easier.

Description	Part #	Quan. on Hand
Grass Mats	21-005-025	1
Lashes, Comic 5.5" Strips	21-050-060	4
Snap Studs	21-055-105	25
Snap Posts	21-055-110	25
Snap Sockets	21-055-115	25
Snap Caps	21-055-120	25
Opto Isolator	24-055-080	2
Triac, Motorolla For Organ	24-115-020	2
Isolated Triac	24-115-060	2
Clippard Spring Cylinder	28-005-010	2
3/4" Bore x 2" Stroke 1/4"ID Mount Cyl.	28-012-012	2
1 1/8" Bore x 1 1/2" Stroke 5/16" Mount Cyl.	28-012-018	1
1 1/8" Bore x 3" Stroke 3/8" Mount Cyl.	28-012-023	1
1 1/2" Bore x 1 1/2" Stroke 1/2" Mount Cyl.	28-012-025	1
2" Bore x 1" Stroke 1/2" Mount Cyl.	28-012-027	1
1 1/8" Bore x 3/4" Stroke Cylinder	28-015-037	1
1 1/8" Bore x 1" Stroke Cylinder	28-015-040	1
1 5/8" Bore x 1" Stroke Cylinder	28-015-070	1
1 5/8" Bore x 3" Stroke Cylinder	28-015-085	1
1/4"-28 x 15/16" Aircraft Bolt	28-016-003	2
3/8"-24 x 15/16" Aircraft Bolt	28-016-010	2
5/16"-24 x 11/16" Aircraft Bolt	28-016-012	2
5/16"-24 x 15/16" Aircraft Bolt	28-016-013	2
5/16"-24 x 13/16" Aircraft Bolt	28-016-014	2
1/4"-28 Self Locking Nut	28-018-005	2
5/16"-24 Self Locking Nut	28-018-010	2
3/8"-24 Self Locking Nut	28-018-015	2
Reservoir,W/Drain, Mini Lubricator	28-020-010	1
Seal Kit, For Air Hose Lubricator	28-020-230	4
Needle Bearing 5/16"ID x 3/8" Long	28-025-945	20
Needle Bearing 5/16"ID x 5/16" Long	28-025-950	5
1/4"ID x 3/8"OD x 1/4" Long Bushing	28-032-010	5
3/8"ID x 1/2"OD x 3/8" Long Bushing	28-032-015	5
3/8"ID x 1/2"OD x 1/2" Long Bushing	28-032-020	5
3/32" Cable Crimps	28-045-917	5
5/16" Stainless Steel Washers	28-045-960	10
5/16" Ground Thrust Washers	28-045-961	10

PARTS LIST Cont.:

Description	Part #	Quan. on Hand
3/8"-24 x 1/2" Thd. x 2 1/4" Collar Pin	28-050-013	5
3/8"-24 x 3/8" Thd. x 1 3/8" Collar Pin	28-050-015	3
3/8"-24 x 1/2" Thd. x 2 3/4" Collar Pin	28-050-040	2
1/2"-20 x 3/4" Thd. x 1 3/4" Collar Pin	28-050-050	2
3/8"-24 x 1/2" Thd. x 2 5/8" Collar Pin	28-050-060	2
3/8"-24 x 1/2" Thd. x 1 3/8" Collar Pin	28-050-070	1
3/8"-24 x 1/2" Thd. x 1" Collar Pin	28-050-075	1
3/8"-24 x 1/2" Thd. x 1 1/2" Collar Pin	28-050-080	1
5/16" x 1" Dowel Pin	28-055-087	5
Large "C" Hinge and Body Lean 2 3/4" Pin	28-055-120	5
"E" Hinge Pin 3 7/8" Pin	28-055-130	5
Retaining Ring For 5/16" Pin	28-055-205	5
1/8" x 1 1/4" Roll Pin	28-060-045	5
3/16" x 1 1/4" Roll Pin	28-060-045	5
1/8" Shaft Collar	28-070-010	5
1/4" Stainless Steel Shaft Collar	28-070-015	5
5/16" Shaft Collar	28-070-025	5
3/8" Shaft Collar	28-070-029	5
Mac Valve Repair Kit	28-080-910	2
5/16"ID x 3/4"OD Bronze Washer	28-085-025	10
1/4" Load Washer	28-085-115	10
5/16" Load Washer	28-085-125	10
3/8" Load Washer	28-085-129	10
500 Watt Bulb	60-040-005	1
1/16" Air Hose	80-005-007	50'
1/8" Air Hose	80-005-010	50'
.170 Air Hose	80-015-015	50'
10-32 x 1/16" Barb Fitting	85-010-005	10
10-32 x 1/8" Barb Fitting	85-010-006	10
10-32 x .170 Barb Fitting	85-010-007	10
10-32 Coupling	85-015-005	15
Flow Control	85-050-015	4
Gasket For 10-32 Fittings	85-050-020	50
3-M Super Whether Strip Adhesive	95-010-030	1
3-M Adhesive Glue, 1 oz. Bottles	95-010-040	1
Spanner Wrench 1 1/4" to 3"	95-070-283	1
Spanner Wrench 3/4" to 2"	95-070-284	1
Rolfe Fur 1 Sq. Foot	AA53 101	1
Fatz Fur 1 Sq. Foot	AC53 101	1
Beach Bear Fur 1 Sq. Foot	AD53 101	1
Mitzi Fur 1 Sq. Foot	AE53 101	1
Billy Bob Fur 1 Sq. Foot	AF53 101	1
Eyelid Lubricant (Small)	APK 1301	1
Dook Drumstick Spring-Fiberglass	ASS 102	1
3/32" x 25' Spider Cable (250 LB. Line)	M00900	1
Dook, B Bob, Wolf, B Bear, Eye Lid	M13552	4
Fatz Eye Lid	M13553	1
Mitzi Eye Lid	M13555	1
Looney Bird Eye Lid	M13556	1





NOTE: Adjust the lights using the outer edge of the ring or rectangle in the illustrations.

MECHANICAL AND AIR TROUBLE SHOOTING GUIDES

The Mechanical and Air Trouble Shooting Guides were developed with you in mind. Thru intense research and study of Billy Bob and the whole gangs past history. These guides will list step by step instructions. First it will tell you what procedures to perform, then list the probable causes of the problem. Then list the repair section you need to refer to, for repairs.
There are three guides to use:

The Main Air Guide; it covers the main air system.

The Character Air System; it covers the valve bank to the cylinder.

The Mechanical Guide; it covers all mechanical movements.

The next few pages will explain how to use the guides, and list the most common problem areas.

Table of Contents

TROUBLE SHOOTING GUIDE

This section is designed to aid in the rapid diagnosis of most common problems in the show. By studying this section on Trouble Shooting you will learn how a problem will become simple. You will also be able to set up your own Trouble Shooting Guide on problems not covered in this manual. To handle a problem in a trouble shooting manner you first need to learn the 3 basic steps, to solve a problem. They are:

1 IDENTIFY THE PROBLEM

2. SECTIONALIZE THE PROBLEM

3. ISOLATE THE PROBLEM

In approaching a problem in this manner, you will be able to take on any problem with out that feeling of PANIC. Lets examine the 3 basic step.

1. IDENTIFY THE PROBLEM:
   This step is simple because, of your daily P.M. of the show, as well as the time the show is running. When a problem is documented and placed on top of the computer, you have IDENTIFIED the problem. Simple huh. If the problem is simple, you should repair it right then by referring to the repair section of this manual.

2. SECTIONALIZE THE PROBLEM:
   This is where troubling shooting really begins. To sectionalize the problem you have to ask yourself, is the problem ELECTRICAL, MECHANICAL, or AIR. To answer this question you need refer to the Trouble Shooting Guide in this manual and follow those procedures step by step.

3. ISOLATE THE PROBLEM:
   Now that you know what the problem area is, you can ISOLATE the problem in that area. What this means is, If the problem is in the electrical area you can now isolate the problem in the electrical area. If the problem is mechanical you can isolate in the mechanical area, and the same for the air system. Now that the problem is isolated, you can refer to the repair section of this manual, and perform the necesary repairs.

Remember learning the 3 basic steps to solving a problem will make the repair job much easier.

AN IMPORTANT NOTE:

When in doubt about a problem , ask your Service Representative, if he or she doesn't know, they should find out for you. It is better to ask when not sure, than to create a bigger problem.

COMMON PROBLEM AREAS
MECHANICS

The most probable cause of movement failure to occur in the Mechanical and Air System are.

1. Lack of lubrications.
2. Pinched or leaking air lines.
3. Misaligned air cylinders.
4. Bad O'rings or seals in the cylinder, causing excessive blow by.
5. Damaged or worn bearings and bushings.
6. Damaged, broken or bent,hinge pins, actuation levers cylinder front and rear mounts, any welded joints.
7. Damaged,loose or missing nuts, bolts,screws, set screws, shaft collars, etc.

Common Hinge Points- Non Twisting:

Movement:	Location:
Mouth	All characters
Ears	Rolfe , Mitzi
Head up/down	All characters
Arm Raise	Rolfe, Mitzi, Beach Bear and Billy Bob.
Elbow	L/Arm Rolfe, R/L Arm Mitzi, Dook, Gorilla.
Wrist	R/Arm Beach Bear, R/Arm Billy Bob, R/Arm Rolfe.
Body Lean	Rolfe, Dook, Fatz, Beach Bear, Billy Bob.
Foot Tap	Fatz, Billy Bob.
Head Tip	Fatz, Billy Bob.

Common Twisting Movements:

Movement:	Location:
Eye Brows	Earl.
Eye Cross	Beach Bear, Looney Bird.
Eyes Left/Right	All Character except Beach Bear, Looney Bird.
Head Left/Right	All Characters
Arm Twist	Rolfe, Beach Bear, Mitzi, Billy Bob.
Elbow Twist	R/Arm Rolfe, R/Arm Beach Bear, R/Arm Billy Bob.
Body Twist	Rolfe, Mitzi, Billy Bob.
Guitar	Beach Bear and Billy Bob.
Head Right	Looney Bird
Arm Swing	Dook and Fatz.

Straight Up/Down Movement with Guide Rod.	Baby Bear.
Straight Up/Down movement with external cable drive and guide rods.	Sun and Moon.
straight push/pull movement with external cable drive and a cable/pulley system.	Spider.

For valve location on valve bank or bit number of movement, refer to the Bit, Valve and Movement Chart, pages 1-011 thru 1-014.

TROUBLE SHOOTING GUIDE
MAIN AIR SYSTEM

SYMPTOM: No character movements, all valve banks are electrically operating, and show lights are functioning.

PROCEDURE:	RESULTS:
1. Check D.P.R. gauges.	See pages 3-003 and 3-004
2. Check the main line air valve. under the platform up-line from the D.P.R.regulator.	If valve is closed SEE page 3-005.
3. If Compressor is running check compressor tank gauge.	Less than 80 p.s.i. Call Compressor Service Co.
4. If Compressor not running. Be sure the compressor main power switch is off. Check the compressor oil level. Turn on the compressor main power switch.	The oil level is OK,or is corrected, and compressor still does not run. See pages 4-019 & 5-011 and 012
5. Check the Air Dryer by pass valve setting.	Valve setting incorrect. See pages 3-005 & 3-013

SYMPTOM: EXCESSIVE OIL IN THE D.P.R. FILTER BOWEL

PROCEDURES:	RESULTS:
1. Check the air filters in the compressor room.	See pages 3-003 and 3-004. Oil found in the filters. Clean or replace the filters.
2. Turn off the main power switch to the compressor. Check the oil level. If level is high Drain off to proper level. Turn main power switch on.	Possible compressor failure Call Compressor Service Co.

SYMPTOM: Excessive Dirt in D.P.R. Filter Bowl.

PROCEDURES:	RESULTS:
1. Check the air filters in the compressor room.	See pages 3-003 and 3-004. Excessive dirt found in filter bowls. Clean or replace filters.
2. Check the intake air filters on the compressor.	Dirt found in intake filters, clean or replace the filters. See page 1-009.

SYMPTOM: WATER FOUND IN AIR FILTER and or LUBRICATOR BOWLS.

PROCEDURES:	RESULTS:
1. Check the Air Dryer by-pass valve setting.	See pages 3-003 and 3-004. Valve setting incorrect. See pages 3-005 & 3-013
2. Check electrical power to air dryer unit.	
3. Check drainage valve on Dryer unit.	If Drainage valve OK. Possible dryer failure. Call Air Dryer Service Co. See pages 1-003 & 1-004.

SYMPTOM: Character movements erratic. More than ± 5% difference in regulator gauge reading.

PROCEDURES:	RESULTS:
1. Check the D.P.R. 40 and 80 p.s.i. gauges.	See pages 3-003 thru 3-005 and 3-014. If either or both air regulators do not hold a set and constant air pressure. Replace the regulator in question.
2. Test the air pressure at the Distribution Manifold. Should be 80 p.s.i. ± 5%.	If the air pressure is less than 80 p.s.i. ± 5%. Repair the D.P.R. Valve See pages 3-005 & 3-014.
3. Manual override the D.P.R. and test the air pressure at the distribution Manifold. Should be 40p.s.i. ± 5%.	If D.P.R. valve does shift, and air pressure is steady and constant at 40 p.s.i. ± 5%. See page 5-011. If D.P.R. valve does not shift, repair the valve. See pages 3-005 thru 3-014. If the D.P.R. valve shifts and the air pressure is less than 40 p.s.i. ± 5%. Replace the Shuttle cock. See pages 3-005 & 3-014.

TROUBLE SHOOTING GUIDE
CHARACTER AIR SYSTEM

SYMPTOM: MOVEMENT NOT FUNCTIONING

PROCEDURES:	RESULTS:
1. Manual override the valve on the valve bank.	See pages 1-011 thru 1-014 and pages 3-003 and 3-004. If valve shifts. See page 5-005. If valve does not shift. Repair valve in question. See pages 3-06 thru 3-08.
2. Test the air flow at the quick disconnect plates, by manually overriding the valve and check for loose hose connections at the valve bank, flow controls and quick disconnect plates.	No air - Flow controls See pages 3-008. No air A/port, override is activated. No air/B port, override is activated. Air flow A/port, override is not activated. No air B/port, override is not activated. See pages 3-006 thru 3-008 Loose hose connections. See page 3-009.
3. Check cylinder alignment between front and rear mount, and check cylinder for internal leaks.	Internal air leak or physical mechanical damage to the cylinder. See pages 3-009 thru 3-030.
4. Test the plumbing harness, by manually overriding the valve. Check plumbing hose connection at the cylinder.	Cut or crimped air line. Loose hose connection to the cylinder. See pages 3-009.

TROUBLE SHOOTING GUIDE
MECHANICAL MOVEMENTS

SYMPTOM: MOVEMENT SLOW, ERRATIC, BINDING OR NOT FUNCTIONING.

PROCEDURES:	RESULTS:
1. Check costume parts at problem area.	Costume parts causing the movement problem. See page 3-136.
2. Examine the problem area for mechanical failure.	Cylinder alignment. See pages 3-009 thru 3-030. * Worn cylinder front and rear mount. * Broken welds * Bushings * Bearings * Steel pins * Attaching hardware

* Refer to the chart below, for the area being worked on , to make the necessary repairs.

Description:	Page Number:
Hinges ------------------------------------	3-032 thru 3-041
Head Assemble ----------------------------	3-042 thru 3-047
Chest, Head Up/Down, Head Tilt and Guitar ---	3-048 thru 3-058
Arms, Shoulders, and Arm Raise --------------	3-059 thru 3-068
Legs, Pelvis, Body Lean, and Body Turn ------	3-069 thru 3-074
All Mechanical Props ------------------------	3-075 thru 3-093

TABLE

OF

CONTENTS

Repair

INTRODUCTION
THE AIR SYSTEM

Description:

The following text deals with the operation, testing, and repair of the air system. It should only be used when a problem arises, and after trouble shooting the problem to a given part. (Problems that are obvious need not be traced, for instance an air leak)
All assembly instructions included, should be followed in the order given. (Note: DO NOT attempt any disassembly or repair of any parts while the system is under pressure)

Contents:

Pages 3-003 and 3-004) Deals with the normal operation of the parts in the air system, and should be fully understood before attempting any repairs. Also, by knowing how the system operates you can test it after repair.

Pages 3-005 thru 3-012) Explains repair of parts in the air system, and is meant to be used only after understanding, the operation of the system.

Pages 3-013 thru 3-030) Contains drawings of parts referenced to in the text.

Operation

Step by Step Description:

Step A. The Compressor, pumps the air pressure inside a storage tank, located under the Compressor Motor.

Step B. Next in line is a storage tank. (to hold a large volume of air)

Step C. The air is piped through an Air Dryer, this removes moisture from the compressed air. Air Filters may have been placed before and after the Air Dryer.

Step D. After the Air Dryer, the air is piped to the Platform, "Wack-A-Demon" and the "Balloon Blow Up".

Step E. (Refer to Drawing Page 3-014) Upon reaching the platform, the air is first applied to a main line shut off valve, then to the Dual Pressure Manifold System. It consists of first, an Air Filter (A), to remove any impurities from the air. Then it goes through 2 air Regulators that control the amount of air pressure allowed to pass through them. (Regulator (B) is set at 40 P.S.I. and Regulator (C) is set at 80 P.S.I.) The 2 air lines are next applied to an electronically controlled 4 way valve. This valve will decide whether the show is operated at a 80 P.S.I. pressure or at a 40 P.S.I. pressure. The last stop in the Dual Pressure Manifold System is a Shuttle Cock. When the 40 P.S.I. mode is selected, it will quickly allow the 40 P.S.I. pressure to pass by while closing off the 80 P.S.I. line.

Step F. The next step in the air system is a Distribution Manifold. It simply allows you to branch off your main line into several smaller lines, these are your individual character lines.

Step G. The air is now run under the stage to the "In Line Lubricator". It will put a vapor of 10wt. oil into the air flow. It is located at the Character's Trap Door in the platform. To set the lubricator, close it until it lightly seats, then open it approximately 1/4 turn of the adjustment knob. The lubricator should not use more than one bowl (filled to the "Full Line") every 2 to 3 weeks.

Step H. The Character Valve Bank is a grouping of several individual 4 way valves, with common air supply and air exhaust internal ports.

Step by Step Description Cont.:

Step I. The Individual Valve: (Refer to Drawing Page 3-015) The valve does basically one thing, switching the air from port B to port A. The valve consists of two basic parts, the solenoid and the air chamber. With the valve in a static position, air should be coming out port B. No air should be coming out of port A. When the valve is either electronically or manually activated, (using the manual override button (A) the air flow will switch from port B to port A. No air should come out of port B when the valve is activated.

Step J. The Flow Control: (Refer to Drawing Page 3-016) After the air leaves the valve bank it goes through an air line to a flow control. The flow control effects the individual movements of the characters. Some of the flow controls are located at the valve bank, and some are located near the cylinder they effect. (Refer to the Bit, Valve and Movement Charts for a listing of flow control locations. Pages 1-011 thru 1-014) All the valves, unless the valve is unused, have 2 flow controls. The Flow control adjusts the air coming out of the cylinder, hence the statement "When in doubt, Meter Out!" (Inglis's Law), the arrow on the Flow Control points toward the valve bank. In the case of a single acting cylinder, where 2 Flow Controls are in one line, and the air flow is adjusted both out going and returning.

Step K. From the flow controls the air goes through air lines to the Cylinder. At present we use single and double acting cylinders. The single acting cylinders will open when air is applied, and close through spring tension. The double acting cylinders will open when air is applied to the rear of the cylinder and air is exhausted through the front. The cylinder will close when air pressure is applied to the front, and air pressure is exhausted through the rear. (Refer to Drawings Pages 3-020 thru 3-029)

Step by Step Description:

Step A. If the Compressor will not operate, check the low oil level and all input power. If power is applied and the oil is at the proper level, see the compressor service manual. (if necessary)

Step B. If any problems are found that deal with Receiver, (Storage Tank) see the compressor service manual.

Step C. The Air Dryer: If water was found at the Air Filter bowl or at the "In Line Lubricators", check the Air Dryer by-pass system. (See Drawing Page 3-013) If the Air Dryer will not operate check for input power. If power is present see the compressor service manual. There is a temperature gauge on the front of the dryer, it should read from 36-42 Degrees Fahrenheit, during normal operation.

Step D. There is a main shut off valve up line from the Dual Pressure Regulator system. If this valve is found closed, open it very slowly. You could damage the characters if you open it quickly. Always apply air to the characters slowly.

Step E. Dual Pressure Regulator System:

1. Air filter: if a yellow signal pops up into the upper cone, depressurize the system and remove the bottom bowl. Clean it using soapy water. Allow it to dry completely before reassembly.
2. Air Regulator: The regulator is adjusted using the removable key. For any problems other than air leaks and adjustments, replace the unit.
3. The 4 way valve: Any problems other than external leaks are probably electronic, refer to Part 4, Electronics Trouble Shooting. If internal problems are still present after trouble shooting, you could have a sticking valve, disassemble and clean the unit. Note all steps followed, clean all parts using a mild detergent soap, if all else fails, replace the unit. (make sure the part must be replaced before disassembly)
4. External Leaks: Always attempt to tighten out a leak, if this fails, replace the gasket at the leak. Suggestion: when disassembly is required, take notes on the steps taken, it will make reassembly easier)

Step by Step Description Cont.

Step F. The Main Air lines:
1. If the line will not stay attached to the barb connection, cut a small piece off the end and try it again. If it still won't hold, replace the barb fitting.
2. If an air line is split and leaking air, DO NOT attempt to tape over the leak or use a line splice; Replace the hose!

Step G. The "In Line Lubricators":
1. For external air leaks in lubricator replace the gasket in question. (Seal Kit Part No. 28-020-230)
2. Fill the lubricator by unscrewing the "Fill Screw" on top of the lubricator. Do not remove the bowl to fill it.

Step H. The Individual Valve (Refer to Drawing Page 3-015)
1. The most common problem is a sticking valve, so check this first. If it is sticking there could be water inside of the valve, check the Air Dryer by-pass system. (See Drawing 3-013) Another cause of a sticking valve, is the air return line coming off the top of the valve could be crimped, check for this first before disassembling the valve. If a valve is sticking or has blow by, it is in need of a internal cleaning:
   a. First pull the retaining ring (D) and remove the cap (F), the cap extension (G), the load spring (H) and the piston (I). Remove the Solenoid assembly, then remove the air chamber cap plate (J).

   b. Clean the valve using soapy water. Check for nicks or foreign mater inside of the valve. If the piston (I) is badly nicked, replace it. Always make sure the problem is un-repairable before replacing the part.

   c. Replace any broken or bad parts and all gaskets using the Mac Valve Repair Kit. (Part # 28-080-910)

   d. Allow the valve and parts to dry completely before reassembly. Grease the piston (I), all O-Rings and gaskets, then reassemble.

Step by Step Description Cont.:

2. If the Solenoid goes bad, air does not switch from Port B to Port A, when electrically activated. And yet air does switch with the manual override button. Your problem is electrical, refer to Part 4, Electronics Trouble Shooting. If the valve will not switch when the Manual Over-ride button is depressed, and yet you are sure air flow is supplied, your problem is probably a sticking valve refer to step 1.
   a. To replace the Solenoid assembly unscrew the 2 screws (B) and remove the old solenoid from the valve.
   b. When replacing with the new solenoid make sure the O-Ring type gasket (C) is placed in properly. (Wipe the gasket with grease before assembly)

3. Air leaks through the top of the air chamber: Remove the retaining ring (D) and replace the O-Ring (E) in the cap, if this does not work, go to the step 1, to repair or replace the parts in question.

4. Blow By: When you pull the lines from the valve and depress the manual override button air should come out Port A with no air coming out Port B. Release the manual over-ride button. Air should come out Port B with no air coming out Port A. If air leaks out of the port that should be closed, you have what is known as "Blow By". To repair a "Blow By" problem see step 1.

Step I. The Valve Bank:

1. If the entire valve bank is not operating, check inlet pressure. If pressure is present, refer to Part 4, Electronics Trouble Shooting.

2. External leaks between the valves: Always attempt to tighten out any external leaks. There are 2 Allen Head screws located at one end of the valve bank, unscrew the 2 valve bank brackets from the wooden support, then tighten the 2 Allen Head Screws.

Step by Step Description Cont.:

3. Disassembly of the Valve Bank should only be attempted after exhausting all other methods to repair.
   a. In the valve bank there is a gasket between each valve. Very carefully, unscrew the 2 Allen Head screws and remove the end cap.
   b. Pull off as large a section of valves as possible without breaking the seal between them, by slipping a small screwdriver between the valves and prying them apart. Only separate the valves far enough to replace the seal or the bad valve. (Be careful you do not damage the gasket or the valve walls)
   c. Replace the bad valve or leaky gasket. Always apply a small amount of grease to the gasket, before reassembly.
   d. Reassemble the valve bank by attaching the end cap and 2 Allen Head screws. Tighten down the screws equally, snuggling down one, then the other, and tightening the rest of the way, working back and forth between the screws.

Step G. The Flow Control (Refer to Drawing Page 3-016)

1. First, double check yourself by pulling the line coming out of it, and turning the adjustment screw (B), the air flow should be affected, remember the Flow Control will only affect the air flowing in the direction of the arrow.

2. If the air flow is not affected when you adjust the Flow Control, replace it. Always replace a Flow Control with the arrow pointing in the same direction as the old one. (Remember "When in doubt, Meter Out")

Step by Step Description Cont.:

Step H. Individual movement air lines; If after searching, you have found a problem in the air line from the quick release to the cylinder, (A crimped or cut line) and the line needs replacing:

1. Pull the old line from the quick release, and attach the new.

2. Following the routing of the plumbing harness, attach the new line to the harness using cable ties. Wherever a rubber protective covering is located, the new line must be placed inside.

   a. Cut the cable ties holding the protective covering in place. Put your new line into place and reattach the covering using cable ties. (Be careful you don't over tighten the cable ties and crimp the air line)

   b. Cut off the old line near the first and last cable tie. Do not completely remove the old line, it is unnecessary and difficult.

3. If the air line will not stay attached to the barb at the cylinder, simply cut off a small piece at the end and reattach the line.

Step I. The Chicago Cylinder; Disassembly and Reassembly.

1. After Trouble Shooting, you have determined that the cylinder is in need of repair.
   a. Measure and note the Critical Angles that the Cylinder affects. (Refer to Pages 3-094 thru 3-135, Critical Angles)

   b. Detach the Front Mount of the Cylinder, using, a wrench for bolt on type, or an Allen wrench, Center Punch and Pliers, used in the Fas-Pin type, or just an allen wrench used in the Collar Pin type of rear mount.

   c. Detach the Rear mount of the Cylinder, using the same tools as described above. (Always use the right tools, and denote disassembly, it will make reassembly easier)

   d. If you notice excessive play in the rear mount when you remove the cylinder from the character, replace the rear mount bushing in the cylinder. Press out the old bushing, note the size and press in the new. Use an Arbor Press, or a piece of wood and a hammer, if an Arbor Press is not available.

Step by Step Description Cont.:

2. Disassembly, cleaning and checking the Chicago cylinder: (Refer to Drawing Page 3-017)
   a. Secure the Cylinder very carefully in a vise. The best place to clamp a cylinder is on the crimp line #1 at the rear of the cylinder.

   b. Use wood, plastic or rubber to protect the cylinder from being marred by the vise jaws.

   c. NEVER clamp any cylinder on the center of the barrel #3.

   d. Using the spanner wrench provided by Creative Engineering. Unscrew the nose end cap #12 in a counter-clockwise direction. Never try to remove the rear end cap #2 on a Chicago cylinder, it has been crimped at the factory and is not removable.

   e. Slide the nose end cap off the piston shaft assembly #6, then slide the piston shaft assembly out of the cylinder barrel #3.

   f. Inspect all the cylinder components for signs of abnormal wear. (It would be a waste of time to rebuild a damaged cylinder)
      1) Look for signs of scoring on the internal cylinder barrel #3, piston #5 or on the piston shaft #7.

      2) Also check the piston shaft to see if it is bent. This is a rare occurrence, however, it is best to check it now.

      3) Another place to inspect is on the bore inside the nose end cap #12. The nose end cap is the most vulnerable component in a cylinder that was installed in a misaligned position.

      4) If any of these components do have deep scratches in them, don't bother rebuilding it, the scars will cause premature seal failure.

Step by Step Description Cont.:

g. Remove all seals from the cylinder bore, piston and nose end cap. Special care must be used when removing the nose end cap seal and wiper ring. The nose end seal #10 is held into place with an internal expanding retaining ring #9, it may be pried out and reused, if care is used during removal.

h. Clean all cylinder components using rags and warm soapy water only. No chemical cleaners should be used as any residual chemicals left in the cylinder could attack the new seals. Blow off components with compressed air prior to reassembly.

3. Reassembly of the cylinder:
   a. Insert the rear bumper "o" ring #4 into the cylinder barrel #3 and push it in until it seats against the rear end cap.

   b. Lubricate the barrel bore thoroughly with black C.E.I. lube. Thoroughly lubricate the piston shaft assembly #6, and install the "U" cup seals onto the piston shaft assembly.

   c. Install the piston shaft assembly #6 back into the cylinder bore #3. You will need to use .003 Brass Shim Stock as a seal compressor (See Drawing Page 3-018)
      1) Wrap about a 2" piece of the shim stock around the front U-Cups on the piston shaft assembly. Wrap the brass only once around the piston.

      2) Carefully slide the piston into the bore of the cylinder, do not twist the piston to fit it in, you could cut the U-Cup.

      3) When the U-Cups are past the threaded end of the barrel, carefully remove the Brass Shim stock from the cylinder bore.

   d. Push the piston all the way into the bore and re-lubricate the bore and piston shaft #7

Step by Step Description Cont.:

e. Put the nose "U" cup seal #10 into place and secure it with the retaining ring #9. Install the retaining ring with a blunt object about 1/2" in diameter. Push in the retaining ring until it is seated and locked.

f. Install the wiper ring #13 into it's groove. Lubricate the nose seal #10 nose bore and wiper ring. Install the nose end cap seal #11 by rolling the seal over the end cap threads onto the "O" ring Landing.

g. Set the front bumper ring #8 into the cylinder bore #3. Slide the nose end cap #12 onto the piston shaft #7. Be careful not to cut the nose seal on the piston shaft threads.

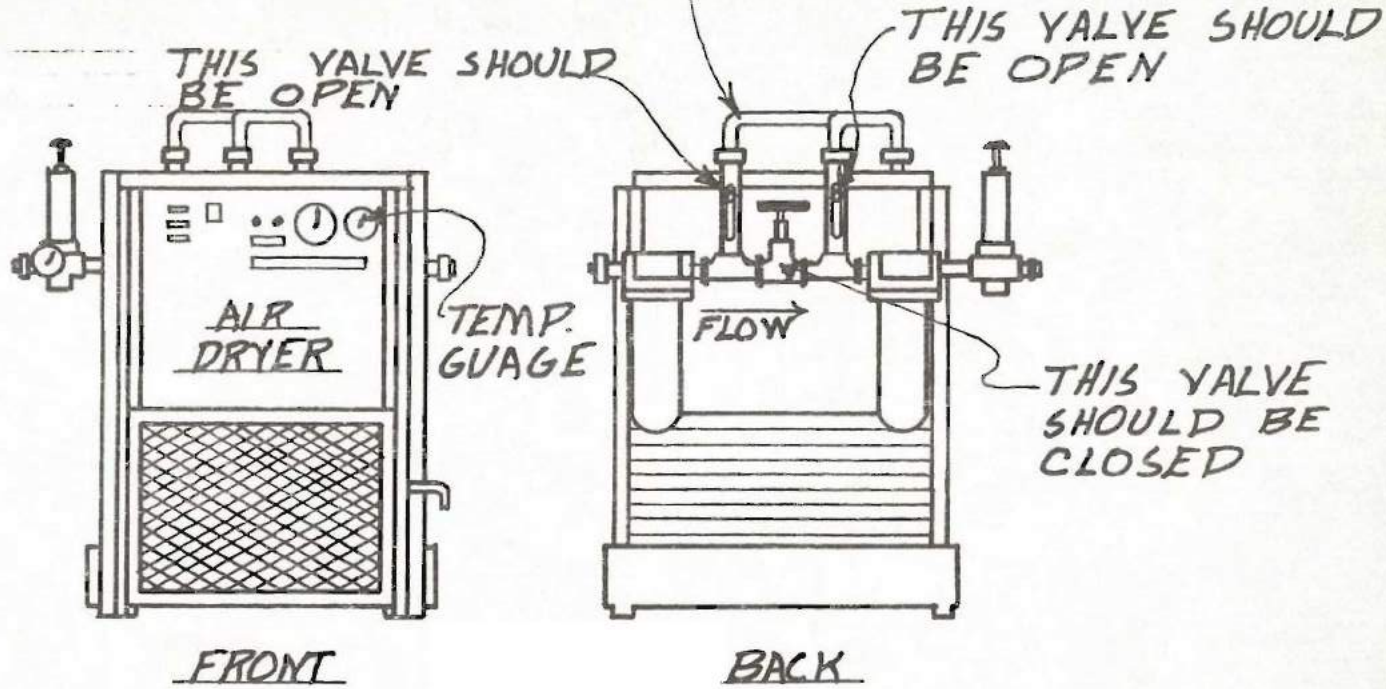
h. Tighten the nose end cap #12 into the cylinder barrel until the inlet ports are in line. Move the piston shaft from end to end to see how the cylinder works. The piston should move free and easily in the bore, the piston should also hit squarely on the bumper "O" ring. If the cylinder does not operate properly, take it back apart and double check your work.

4. Disassembly and repair of the the Pan Cake cylinder: (See Drawing Page 3-019)
   a. Remove the rear end cap using the screws as indicated in the drawing.
   b. Clean and check the part using the same steps as described in the Chicago Cylinder Rebuilding.
   c. Reassemble all the parts. Replace any bad gaskets. It is not necessary to use Brass shim stock as a seal compressor.

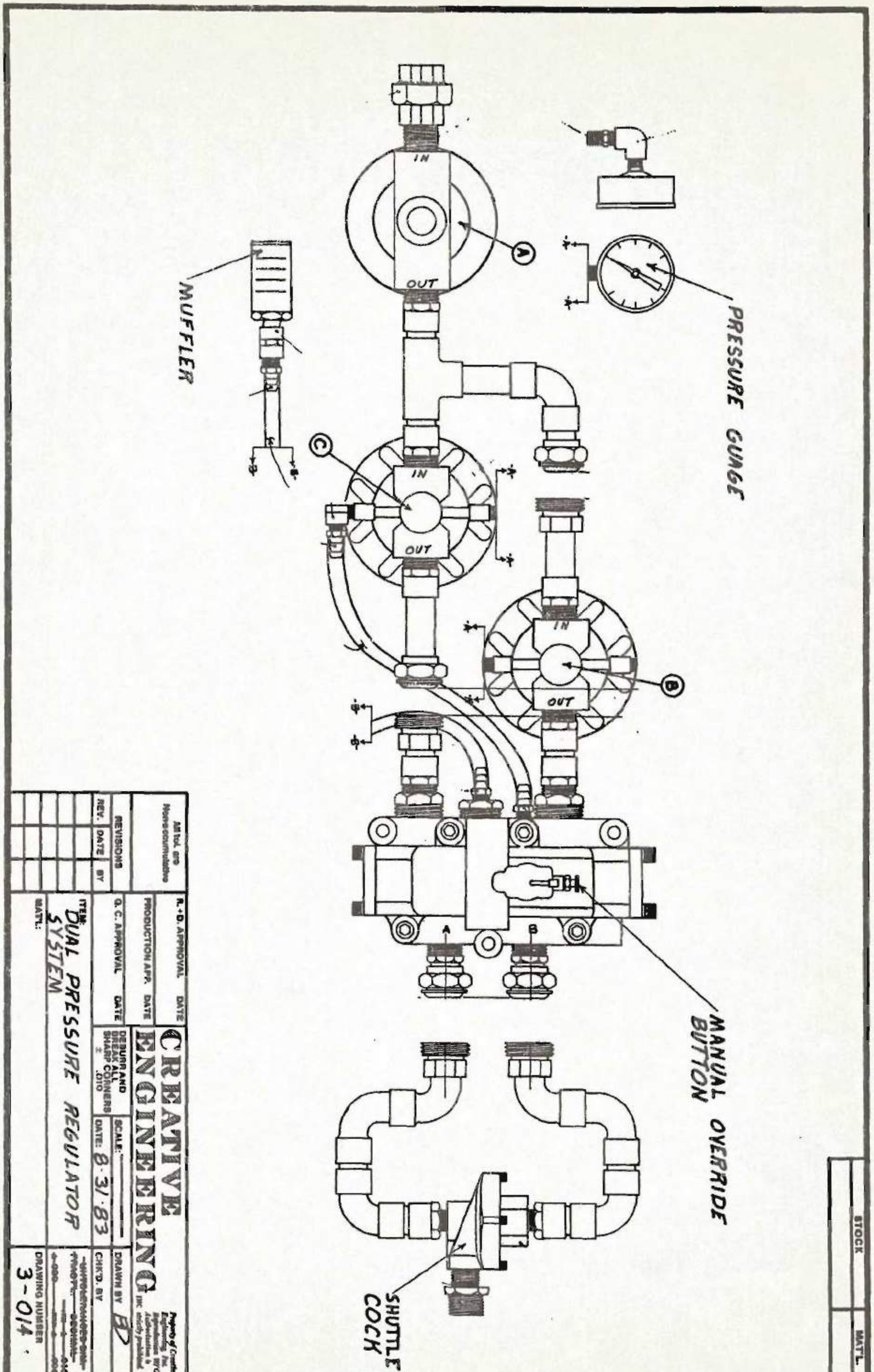
5. To repair a Tol-O-Matic cylinder: (See Drawing Page 3-030)
   a. Remove the screws in one end of the cylinder only. The cable attaches to the piston using the threaded sleeve, remember to note your steps.
   b. Replace any bad gaskets, oil the bore using 10wt. non-detergent oil. Check the bore of the cylinder if it is badly scared, replace the cylinder.
   c. Reassemble the parts, and apply air. Check the cylinder for a smooth and complete movement.

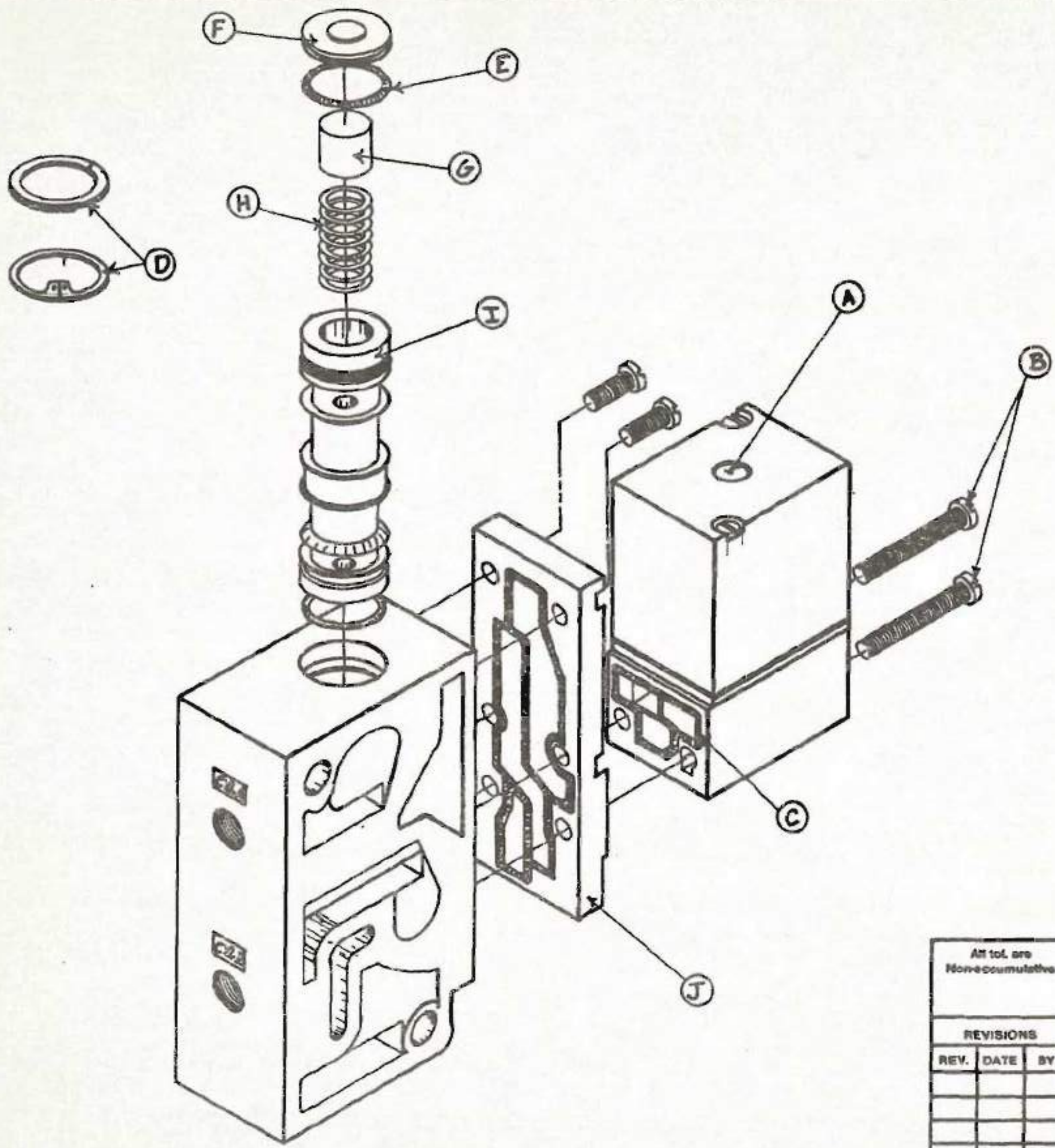
STOCK	MAT'L.

DRYER BYPASS SYSTEM



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	PRODUCTION APP. DATE		
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE: —— / DATE: 1·5·84	DRAWN BY [signature] / CHK'D. BY ——
REV. / DATE / BY	ITEM: AIR DRYER		~~UNTOLERANCED DIM. FRACT'L. DECIMAL .XX ± .010 ± .020 .XXX ± .005~~
	MAT'L:		DRAWING NUMBER 3-013


IN
OUT
A
B
C
MUFFLER
PRESSURE GUAGE
MANUAL OVERRIDE BUTTON
SHUTTLE COCK
STOCK
MAT'L
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PRODUCTION APP. DATE
Q. C. APPROVAL DATE
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DEBURR AND BREAK ALL SHARP CORNERS ± .010
SCALE:
DATE: 8-31-83
DRAWN BY
CHK'D. BY
ITEM: DUAL PRESSURE REGULATOR SYSTEM
MAT'L:
DRAWING NUMBER
3-014



STOCK	MAT'L.

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DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 8·31·83

DRAWN BY BP

CHK'D. BY

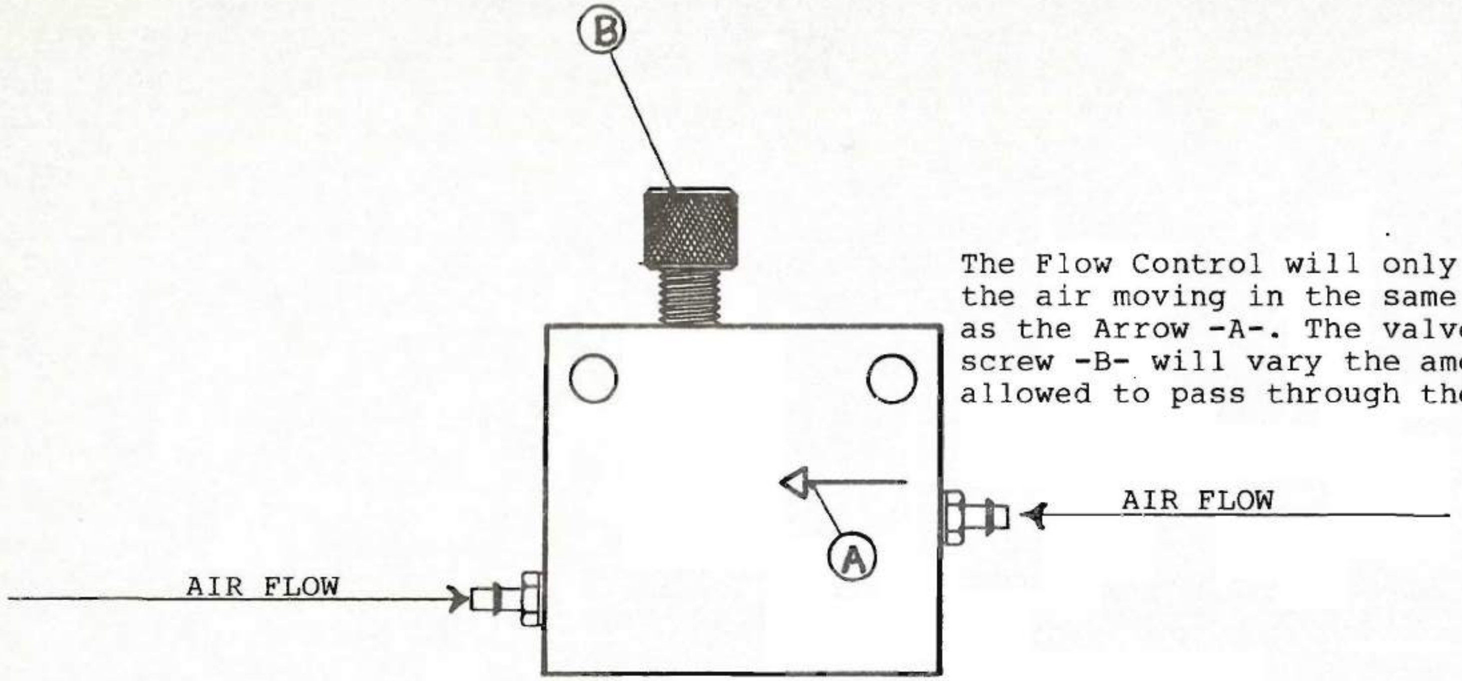
~~UNTOLERANCED DIM. FRACT. DECIMAL .XX ± .010 ± .000 .XXX ± .005~~

ITEM: EXPLODED VIEW MACK VALVE

MAT'L:

DRAWING NUMBER 3-015

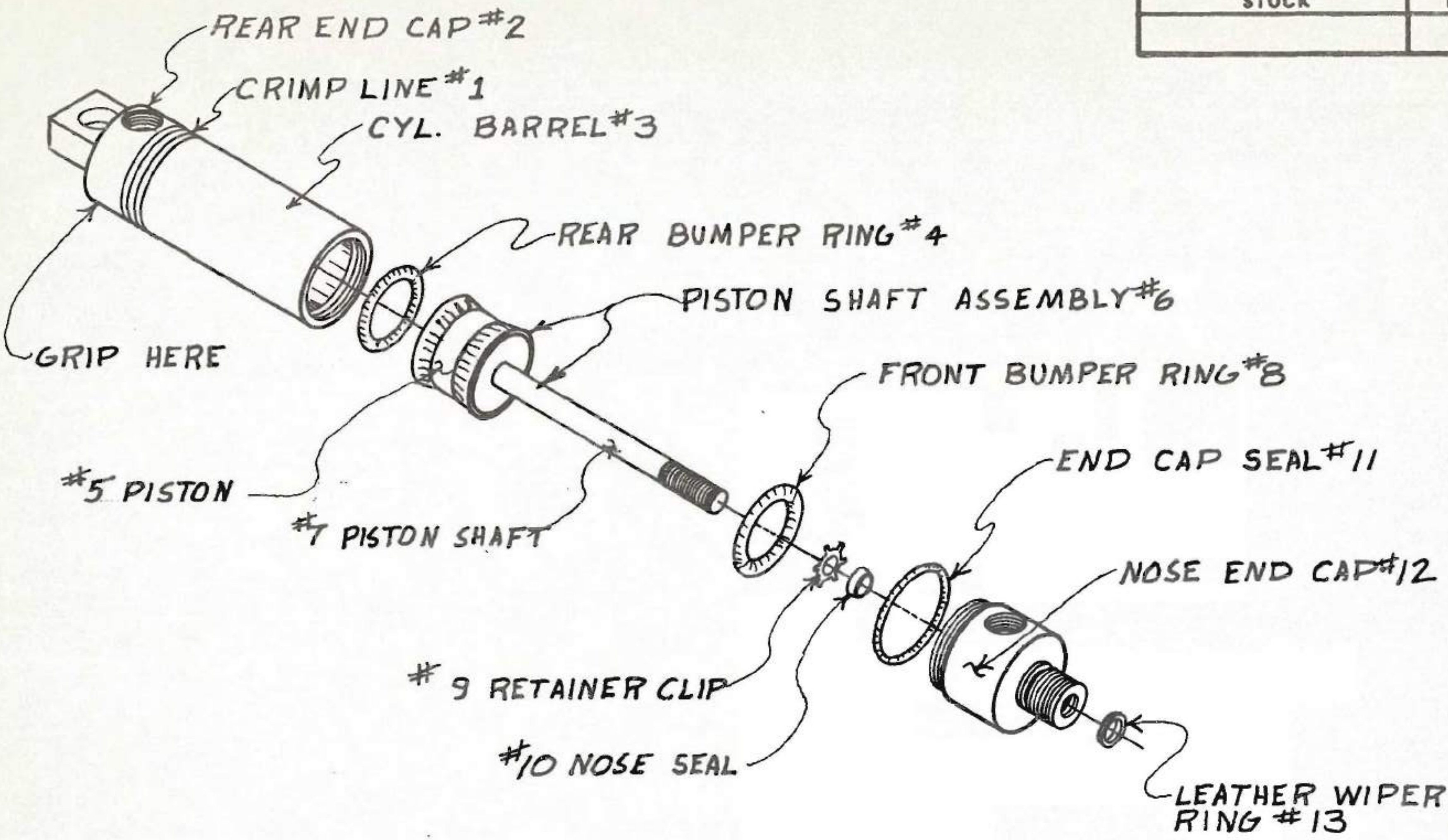
STOCK	MAT'L.



The Flow Control will only meter the air moving in the same direction as the Arrow -A-. The valve adjustment screw -B- will vary the amount of air allowed to pass through the Flow Control.

When air is flowing against the Arrow -A-, the Flow Control is open and does not effect the air flow.

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REV. / DATE / BY	ITEM: FLOW CONTROL OPERATION		~~UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .XX ± .010 .XXX ± .005~~
	MAT'L:		DRAWING NUMBER 016



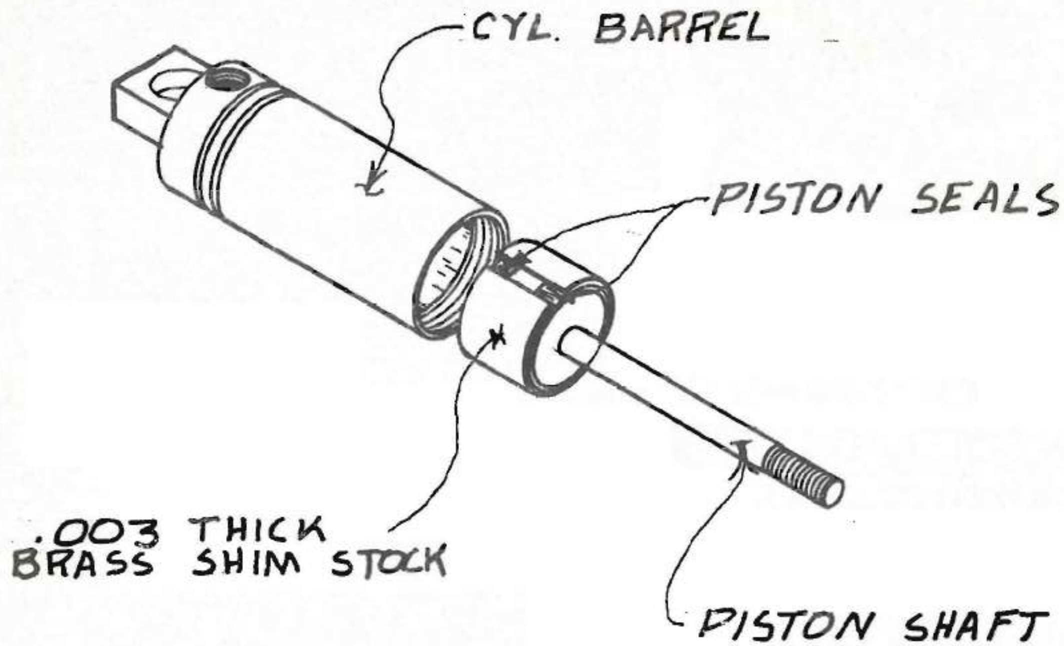
STOCK	MAT'L.

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REVISIONS						
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			DATE: 2·10·83			
			ITEM: EXPLODED VIEW CHICAGO CYLINDER			
			DESCRIPTION:			

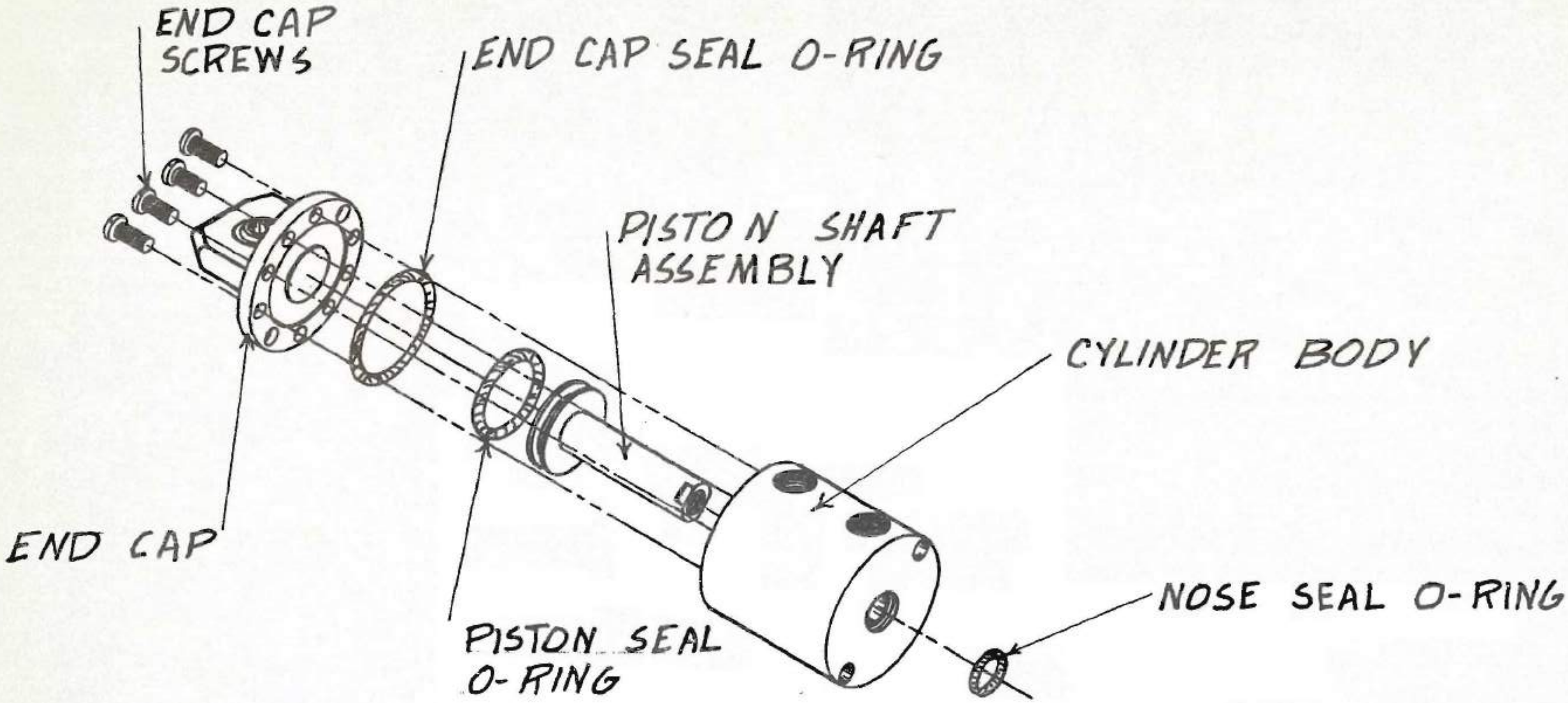
DRAWN BY	BD
CHK'D. BY	
TOLERANCES FRACT'L. .020	DECIMAL .XX ± .010 .XXX ± .005
DRAWING NUMBER	3-017

STOCK	MAT'L.



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REVISIONS REV. | DATE | BY	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 | SCALE: | DATE: 9 · 8 · 83 | DRAWN BY BD | CHK'D. BY
	ITEM: CHICAGO CYLINDER ASSEMBLY STEP	UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:	DRAWING NUMBER 3-018

STOCK	MAT'L.



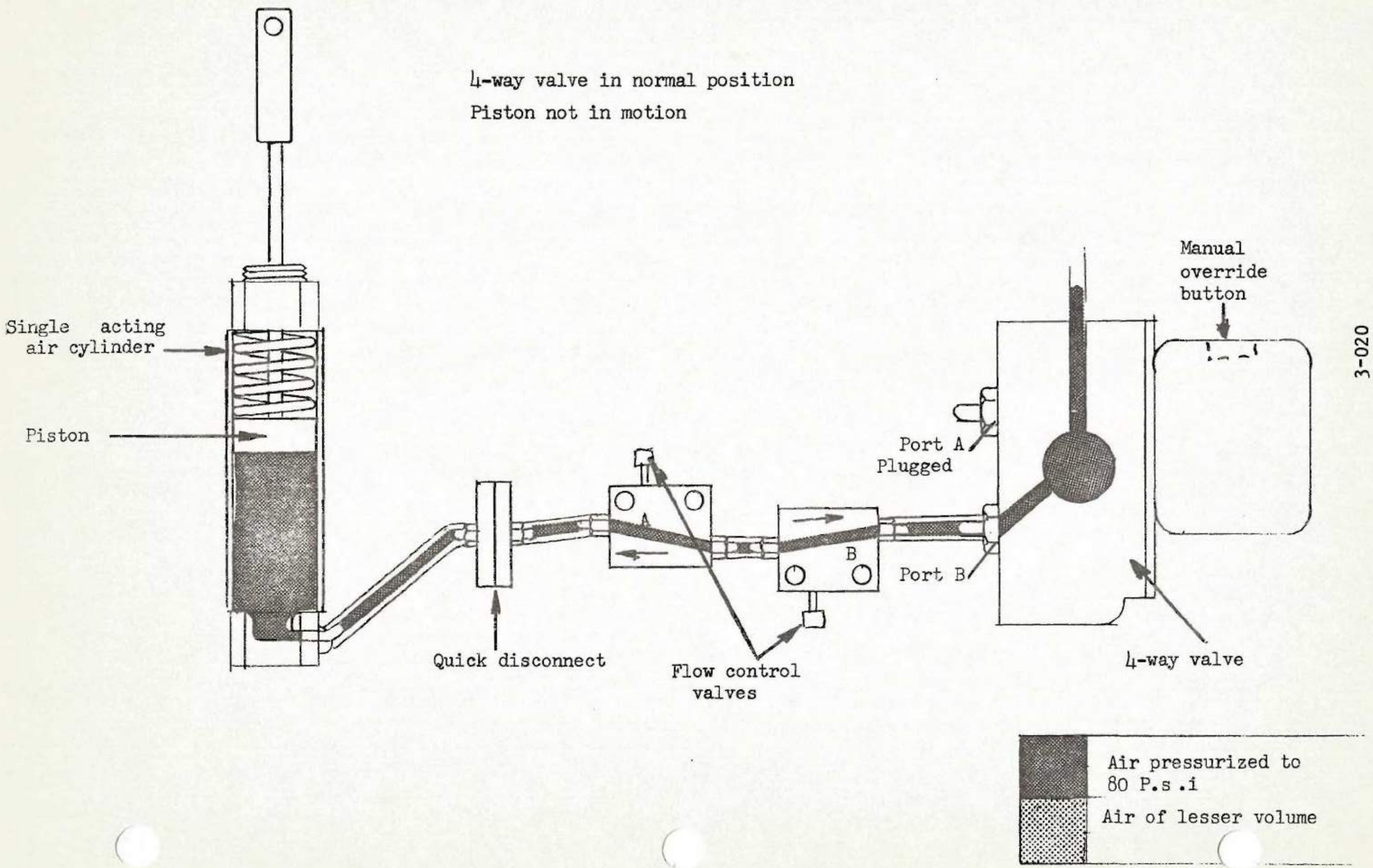
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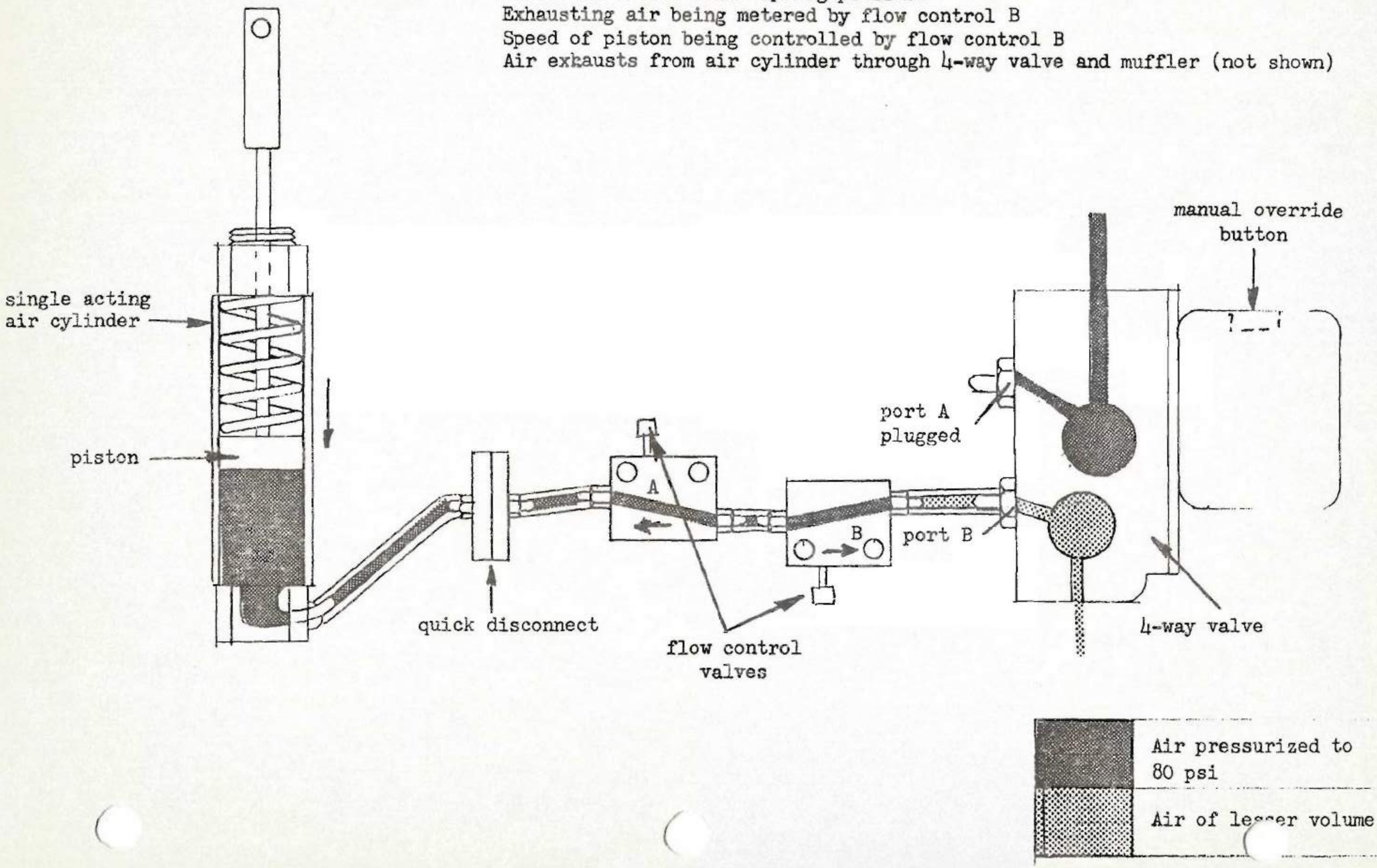
REVISIONS						
REV.	DATE	BY	SCALE: 1/2-1	APPROVED BY DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	DRAWN BY BD
			DATE: 1·31·83			CHK'D. BY
			ITEM: EXPLODED VIEW PANCAKE CYLINDER			TOLERANCES FRACT'L. .020 DECIMAL .XX ± .010 .XXX ± .005
			DESCRIPTION:			DRAWING NUMBER 3-019

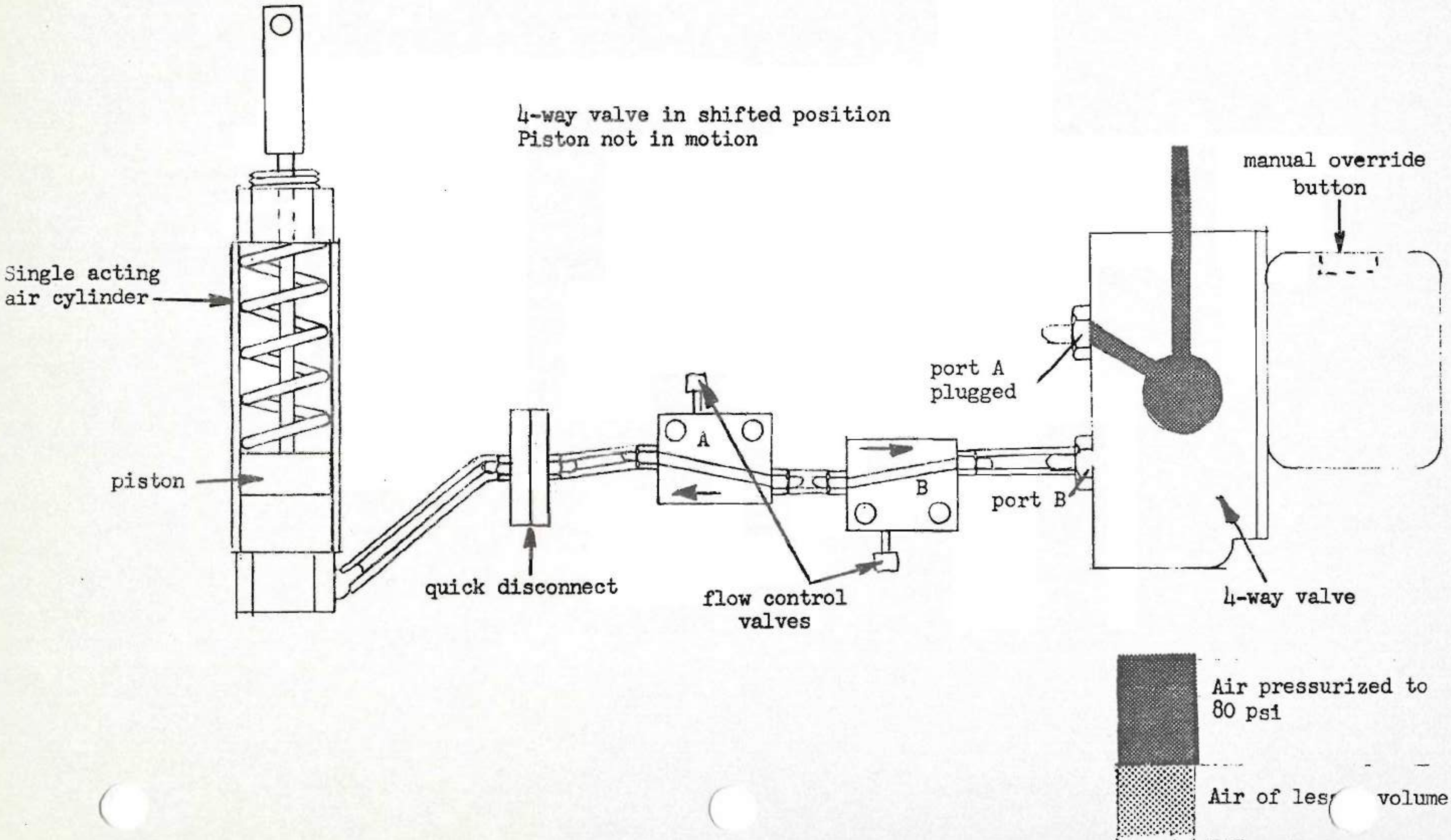
SINGLE ACTING CYLINDER CYCLE

4-way valve in normal position
Piston not in motion

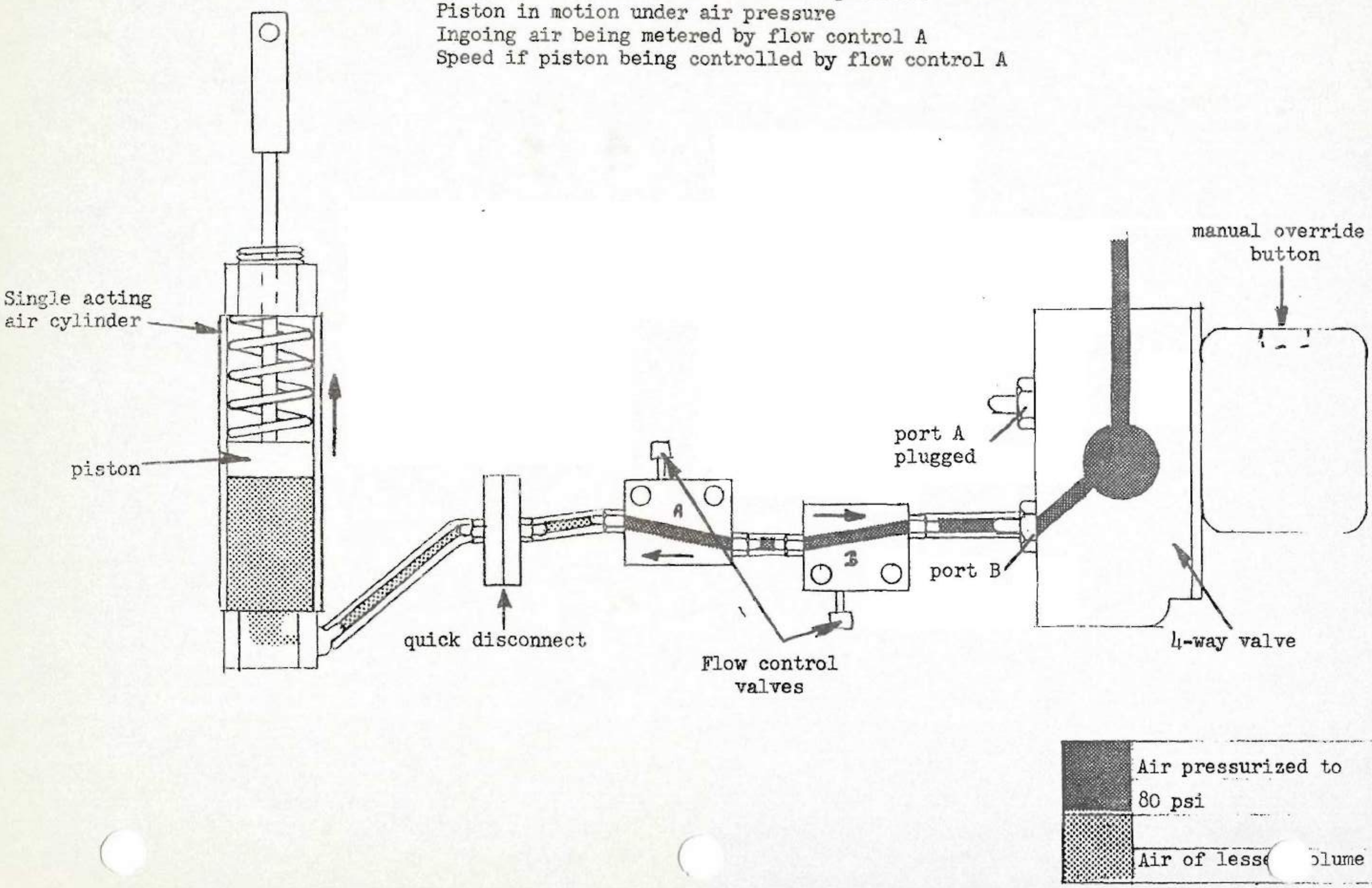


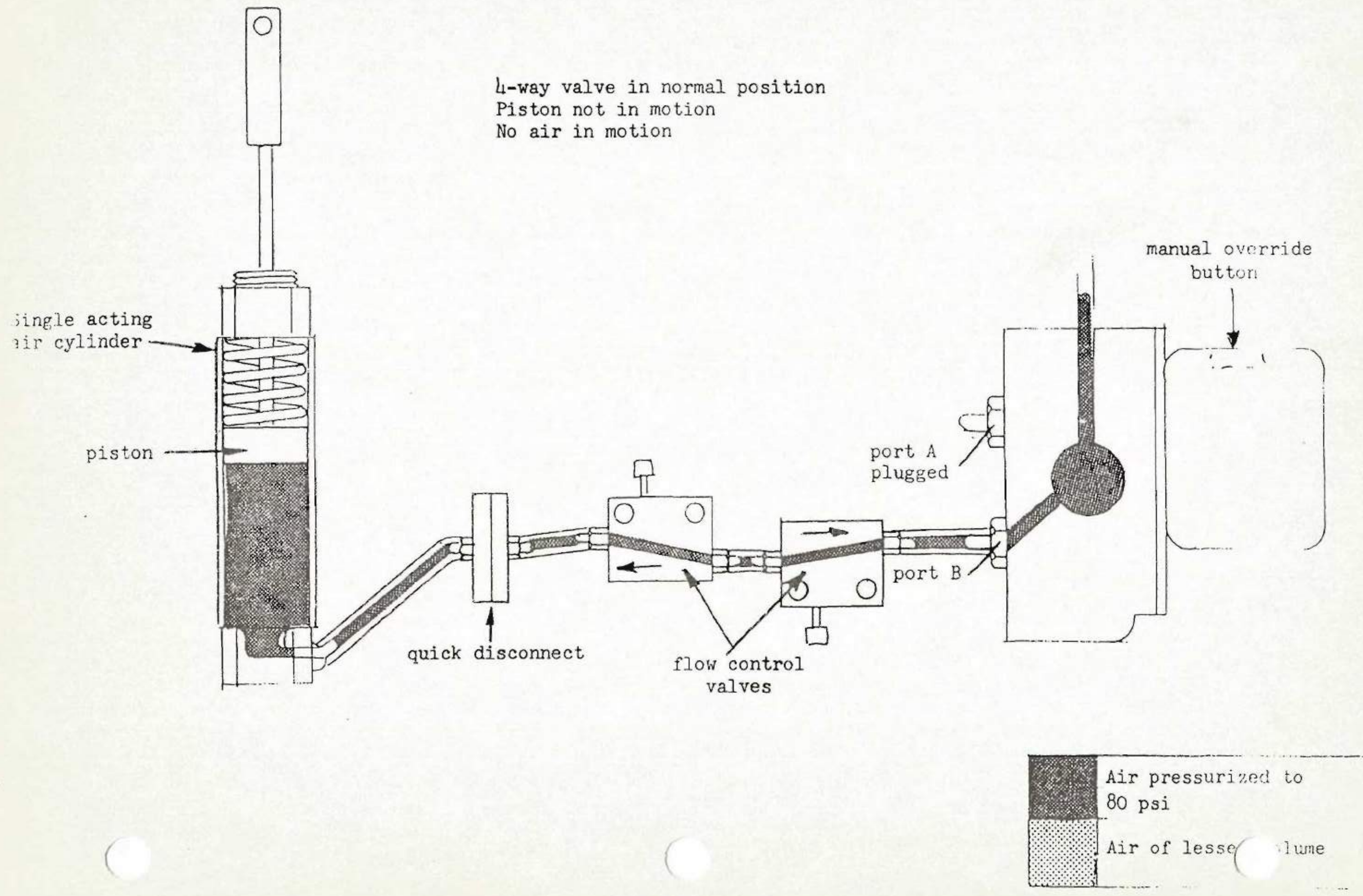
4-way valve in shifted position
Piston in motion under spring pressure
Exhausting air being metered by flow control B
Speed of piston being controlled by flow control B
Air exhausts from air cylinder through 4-way valve and muffler (not shown)




4-way valve in shifted position
Piston not in motion
Single acting
air cylinder
piston
quick disconnect
A
B
flow control
valves
port A
plugged
port B
manual override
button
4-way valve
Air pressurized to
80 psi
Air of les volume

4-way valve shifted back to normal position
Piston in motion under air pressure
Ingoing air being metered by flow control A
Speed if piston being controlled by flow control A

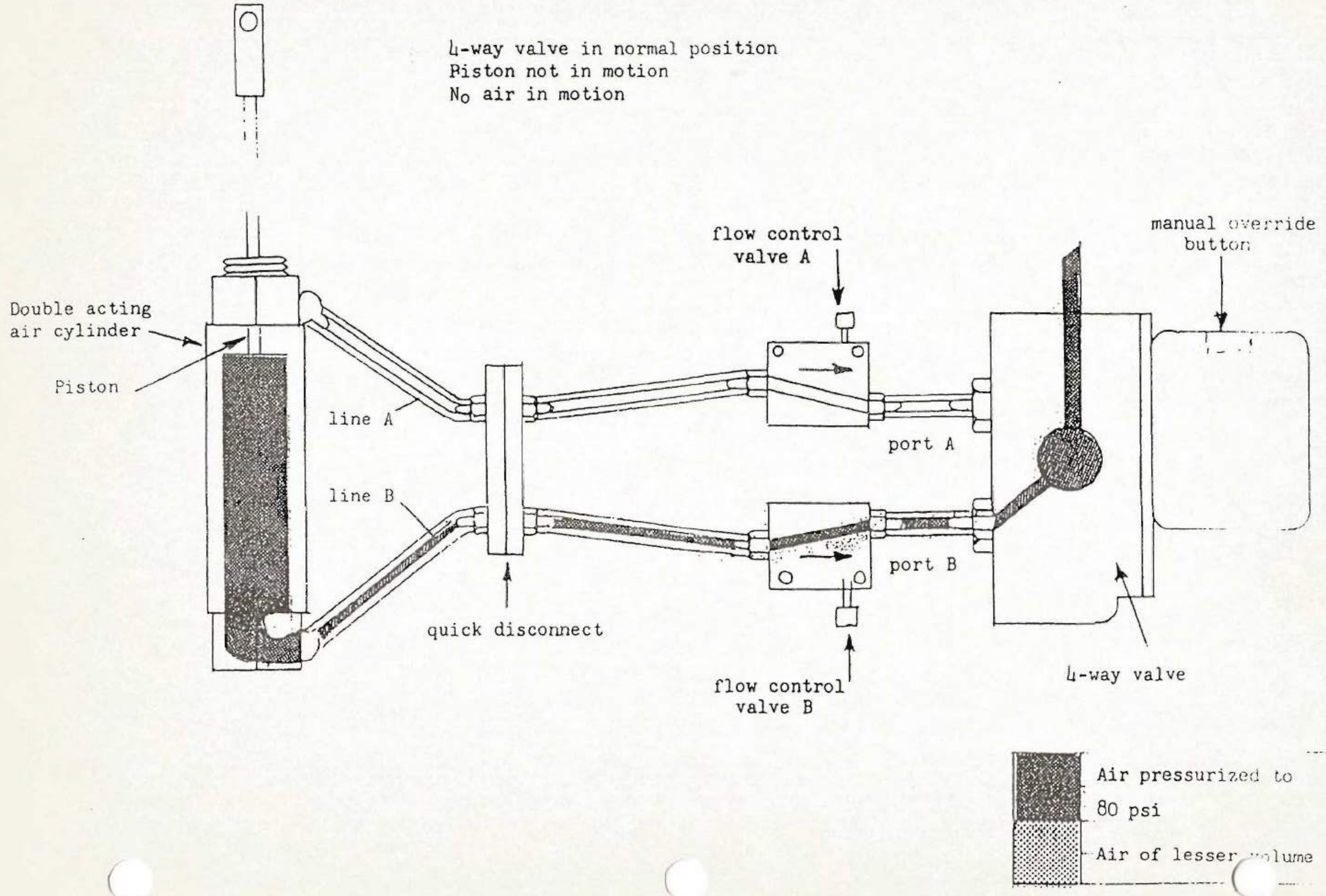




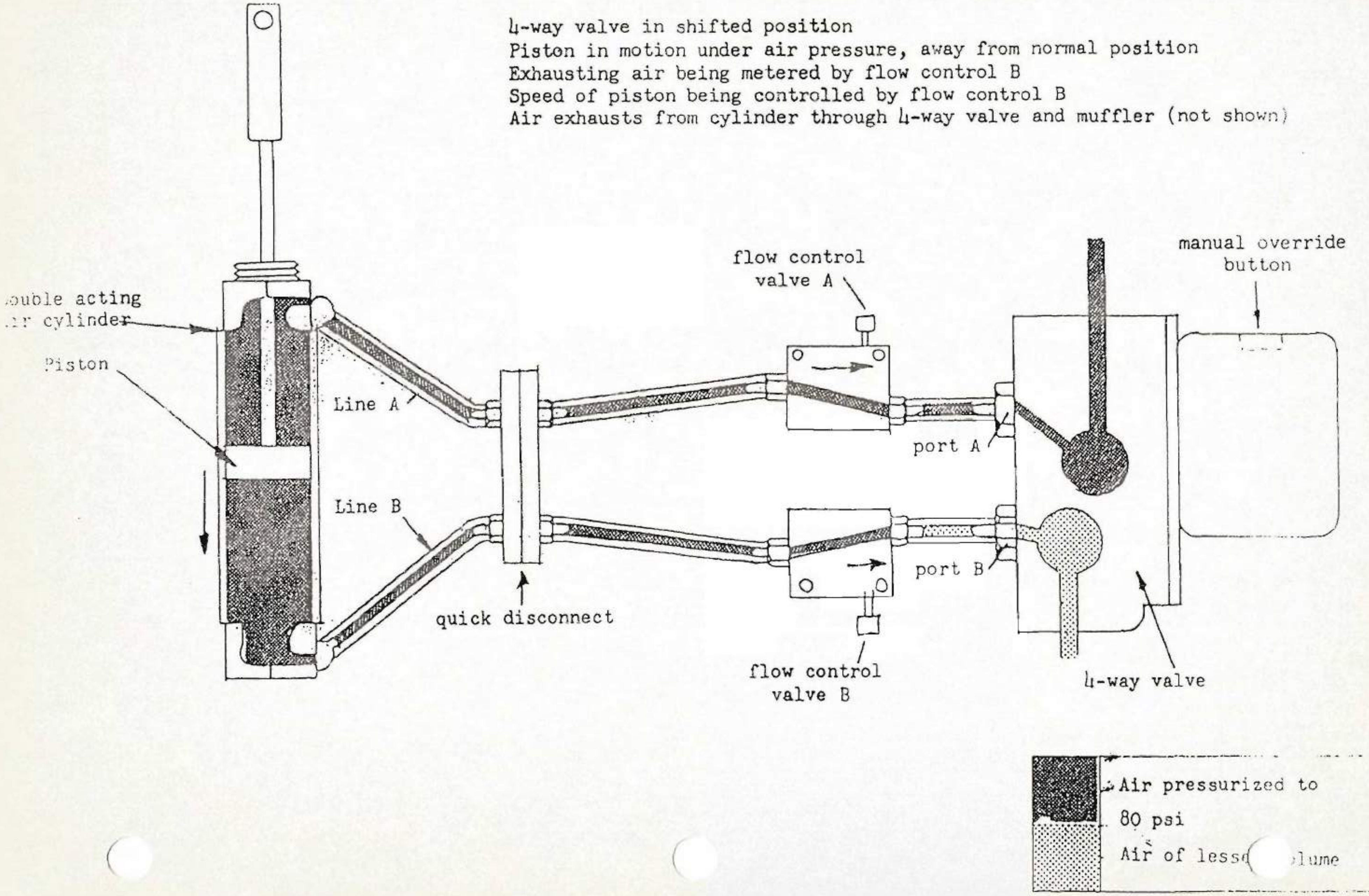
4-way valve in normal position
Piston not in motion
No air in motion
Single acting air cylinder
piston
quick disconnect
flow control valves
port A plugged
port B
manual override button
Air pressurized to 80 psi
Air of lesse lume

DOUBLE ACTING CYLINDER CYCLE

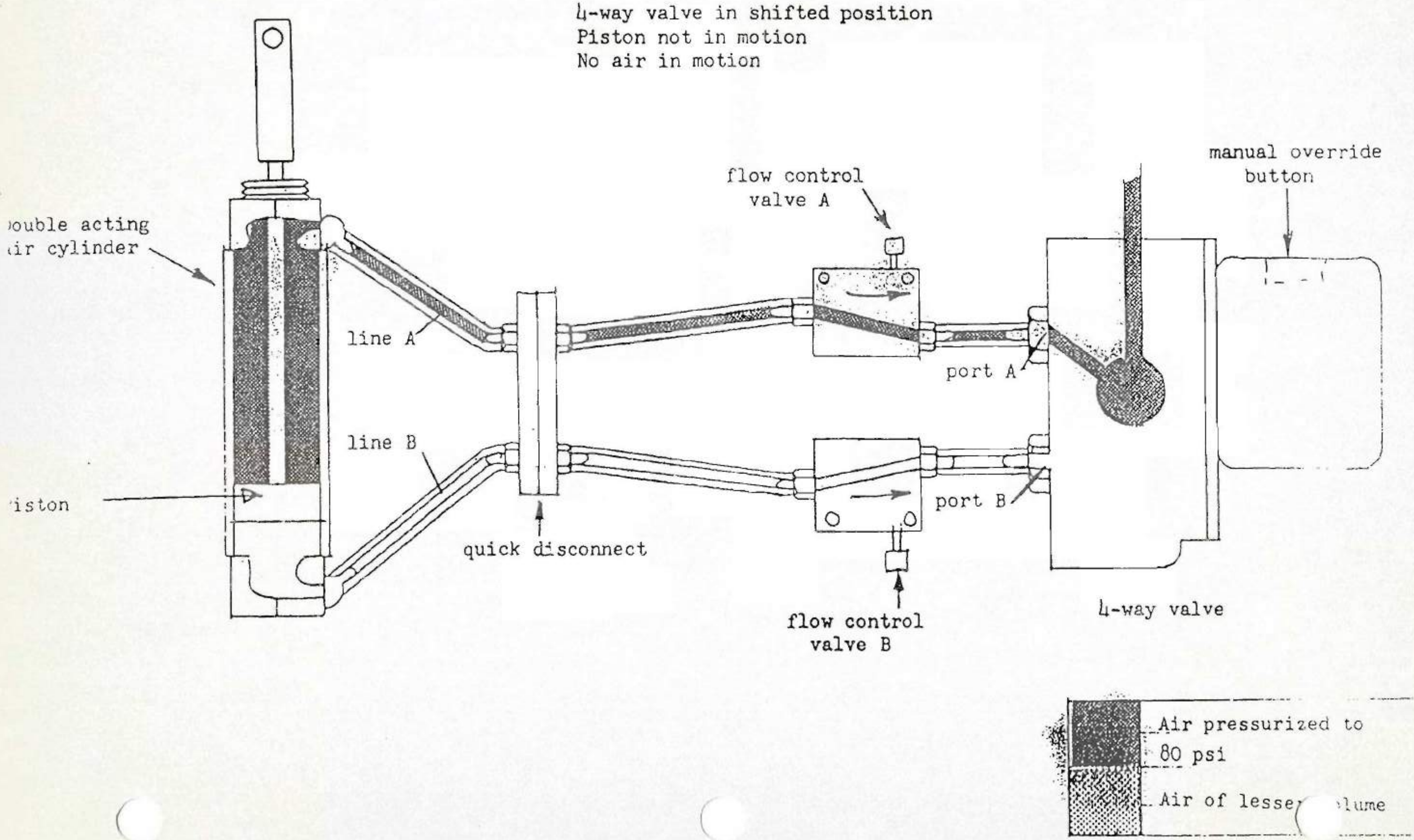
4-way valve in normal position
Piston not in motion
No air in motion



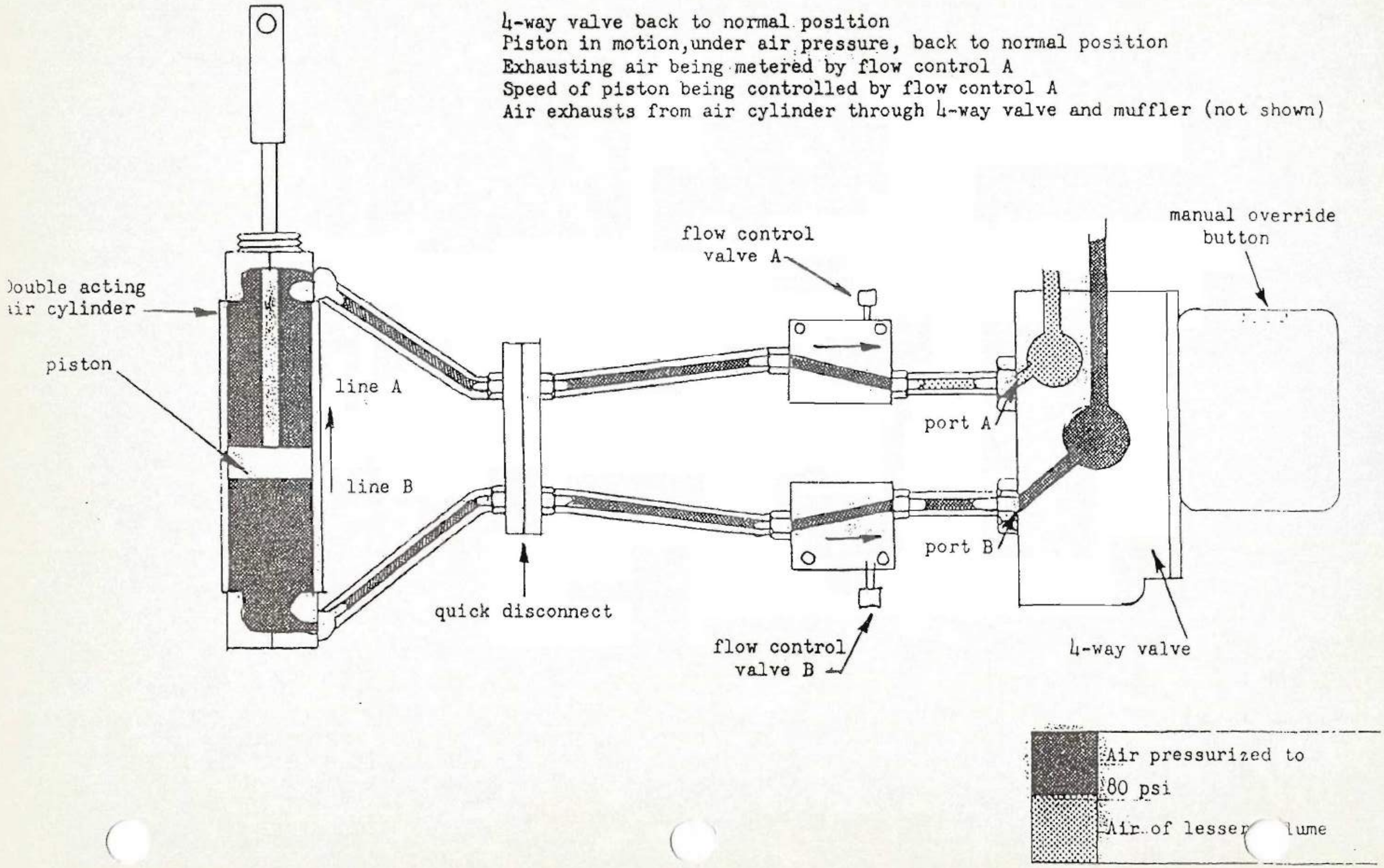
4-way valve in shifted position
Piston in motion under air pressure, away from normal position
Exhausting air being metered by flow control B
Speed of piston being controlled by flow control B
Air exhausts from cylinder through 4-way valve and muffler (not shown)

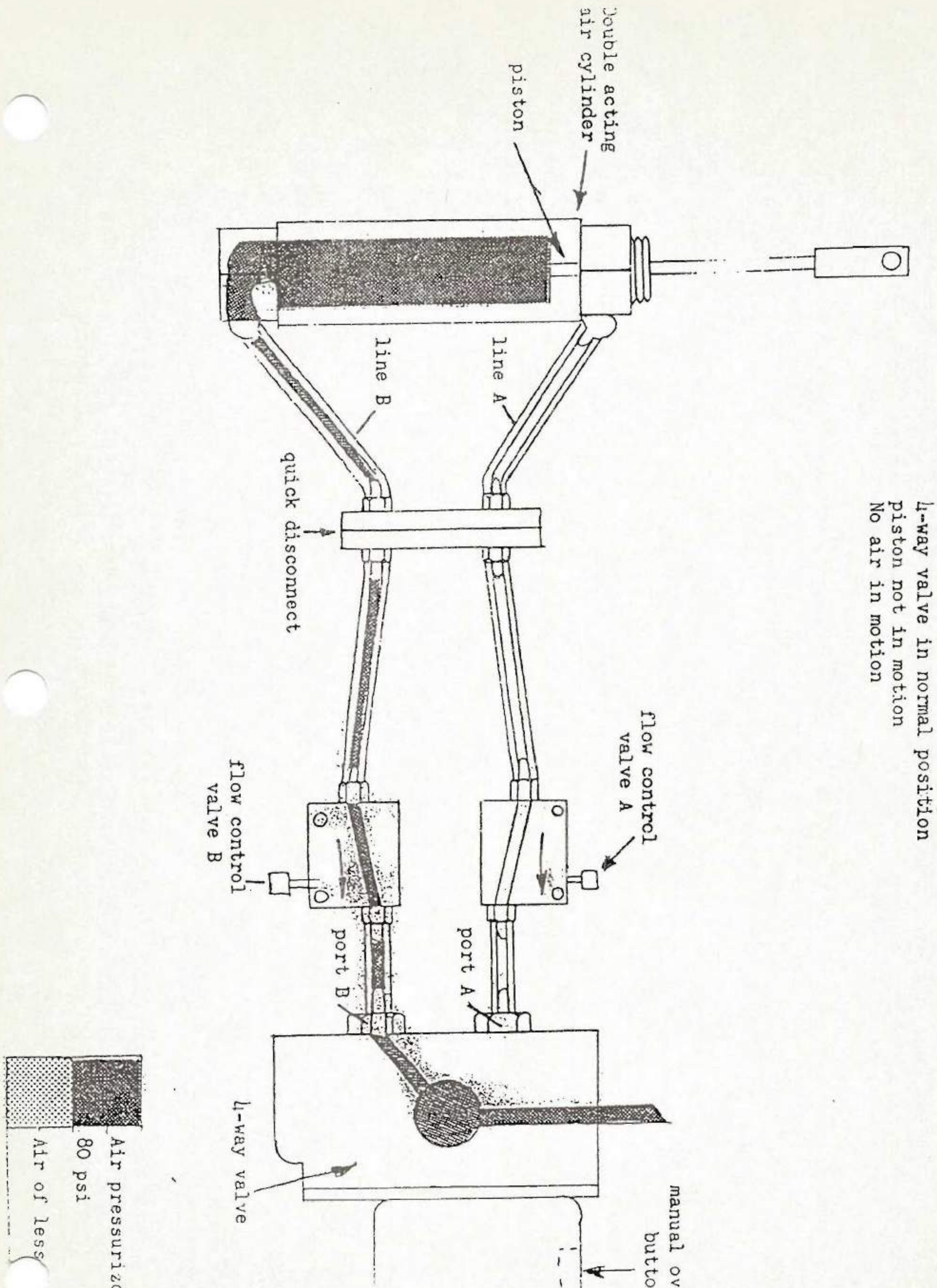


4-way valve in shifted position
Piston not in motion
No air in motion



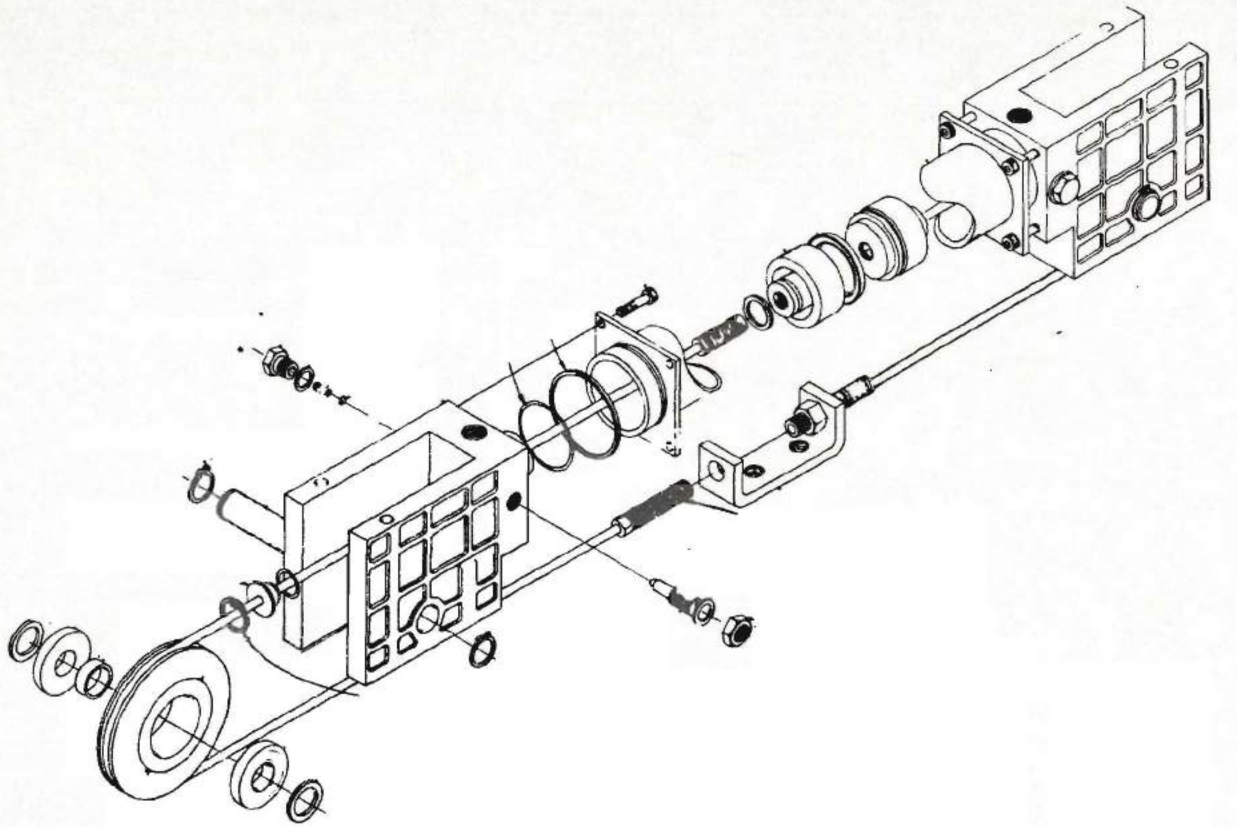
4-way valve back to normal position
Piston in motion, under air pressure, back to normal position
Exhausting air being metered by flow control A
Speed of piston being controlled by flow control A
Air exhausts from air cylinder through 4-way valve and muffler (not shown)





4-way valve in normal position
piston not in motion
No air in motion
Double acting air cylinder
piston
line A
line B
quick disconnect
flow control valve A
flow control valve B
port A
port B
4-way valve
manual override button
Air pressurized to 80 psi
Air of less
volume

STOCK	MAT'L.



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REV. / DATE / BY			DATE: 9·26·83	CHK'D. BY
	ITEM: BASIC ASSEMBLY TOL-O-MATIC CYLINDER			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-030

INTRODUCTION
MECHANICAL REPAIR

Description: The following text deals with the mechanical aspects of the show, and is Only to be used after Trouble Shooting the problem to a specific movement. Each part in this section will contain drawings and instructions of how to repair the movement in question, whether the movement is typical to all characters or is special to only one character. The object of this section is to get the movement into proper operating condition. Critical adjustments will be set after the movement operates properly. (See Pages 3-094 thru 3-135) It is suggested that if a weld breaks, or a metal part breaks into two pieces, not to have it welded in the field. It will probably be cheaper and easier to replace the bad part. Removal of all art pieces (Fiberglass Bodies, Duct Hose Arm Covers, Fur and Foam pieces, etc.) are only to be removed enough to allow easy access to the movements in question. (Refer to Pages 3-136 thru 3-187, Cosmetics for further information) Air down the character, for any repair steps requiring removal of cylinders from the character, unless noted in the text. Save any Retro-Fit drawings you receive. Three notes to be followed in all repair steps are:

One; NEVER attempt to repair a problem unless you are SURE that it is the problem. (If it's not broke, don't fix it!)

Two; NEVER attempt to disassembly anything without the PROPER tools.

Three; ALWAYS note the disassembly steps you followed.

Contents:

Hinges

Description: In 1982, Creative Engineering made a change in the types of hinges used. Before 1982 we used a oil impregnated bushing in one side of the hinge, and held the pin solid in the other side of the hinge using set screws. Since 1982 we have changed to a needle bearing and free floating type of Pin.

A. The old style hinge will generally go through 3 steps until it must be replaced. First the pivot points will dry out from mis-alignment, side loads or improper maintenance. Second, the Bushings will wear or become loosened inside of the pressed hole. Third, the walls of the aluminum hinge will become elongated. In the first and second steps a hinge can be saved, but if the hinge is allowed to reach the third step it must be replaced.

B. If an old style bushing type hinge has developed excessive side or back and forth play, but the aluminum around the pivot hole has not been elongated, you may want to replace the bushing.

1. Remove the part from the character and work with it in a vise. (Refer to the characters movements Pages 3-042 thru 3-093)

2. Drill out the old bushing using a 23/64" drill. Hold the drill as square as possible to the hole and drill through the bushing. You may need to press out pieces of the bushing, use a small pin or Awl.

3. Clean the hinge, make sure no metal chips will catch in the rebuilt hinge, and cause premature break down.

4. Press in the new bushing using a Arbor Press, if one is not available, place a piece of wood on top of the bushing and tap it in using a Hammer. In the case of the old hinges the bushing used is a 5/16"ID x 3/8"OD x 3/8" long Flange Bushing (Part # 28-030-040) If the hole is a little over size, mar the inside of the hole using a awl. If after this, you still cannot press in the bushing the hinge must be replaced. Re-assemble the hinges by reversing the disassembly steps you followed. (See Pages 3-042 thru 3-093)

C. On one side of the old style hinge is the bushing, and on the other side their is a 5/16" hole and set screws to hold the pin in place. It is important to the operation of the hinge that the pin is held solid. If it cannot be held solid because the set screw taped hole is striped, you can repair it by drilling and taping the hole to the next bigger tap size. If the hole is elongated, of course the hinge must be replaced.
   1. Determine the present size of the taped set screw hole.
   2. Drill out the hole to the next larger tap size.
   3. Tap the hole, clean the part and re-assemble using the correct size set screw.

D. If the old hinge must be replaced and you have an old style hinges mating with the new style, refer to Retro-Fit Drawings, Pages 3-035 thru 3-037 for assembly.

E. The new style, Needle Bearing type hinge, should have few problems, if the hinge is greased properly in P.M. (Just apply grease "C.E.I. lube" between the flanges of the hinge and actuate the hinge to work the grease in) The new style hinge will only be disassembled during rebuilding of the character, and for repair. (See Page 1-009, Semi-Annual P.M.)

F. Repair of the new style hinge is limited because the hole is usually marred and the bearing loosens in the hole or is damaged do to wear and tear. If care is taken during P.M. of the show, these problems can be caught before replacement of the hinge is required.

G. To repair a new style hinge:
   1. Using an Arbor press and a 3/8" or 7/16" Steel Pin, press out the defective bearing, denote the length of the bearing and get a replacement. The needle bearings used in the show are 5/16"ID x 1/2"OD x 3/8" Long (Part # 28-025-945) and 5/16"ID x 1/2"OD x 5/16" long. (Part # 28-025-950)
   2. Clean the hinge of grease and any foreign matter.
   3. Press the correct bearing into place, making sure the bearing is pressed straight.

4. If you must replace a bearing while the hinge is still attached to the character, for time reasons, or the hinge is welded to the frame and is unremovable, (See pages 3-042 thru 3-093) or if an Arbor Press is unavailable.
   a. Tap out the defective bearing using a 7/16" steel pin and a Hammer.

   b. Place a piece of wood on top of the new bearing and tap it into place using a hammer. It is critical to the operation of the hinge that the bearing has a tight fitting press, and is pressed in straight, so be very careful.

   c. If you cannot get a good press on the bearing, mar the inside of the hole using a Awl. If you still cannot get a tight press, replace the hinge.

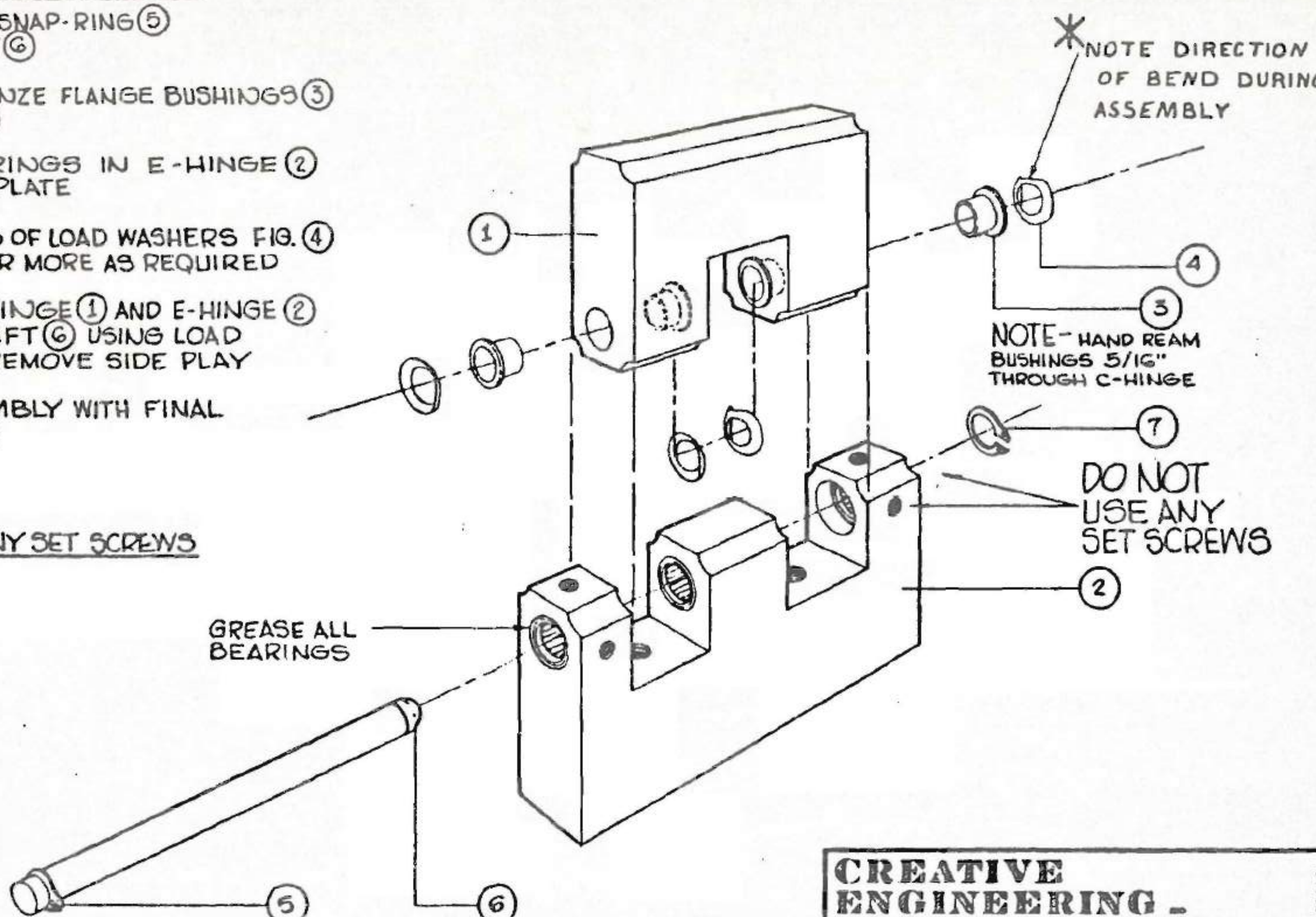
H. For a drawing of the new style hinges used in the show refer to Pages 3-038 thru 3-041. You will notice that in the assembly drawings of all the hinges, their are 2, 5/16" Load Washers (Part #28-085-125) and 2, 5/16" Flat Washers used. The Flat Washers, have 2 types used one is a 5/16" Stainless Steel Washer (Part #28-045-960) and the other is a 5/16" Ground Thrust Washer (Part #28-045-961). In the case of all hinge assemblies except the M.U.M. (Male Uni-Mount) to the F.U.M. (Female Uni-Mount) and the F.U.M. to the Stud mount, the washer to use is the 5/16" Ground Thrust Washer. For the M.U.M. and F.U.M. type hinges use the Stainless Steel Washer. The purpose of these load and flat washers is to decrease the side play in an assembled hinge to a minimum, so the use of the washers may vary with each hinge, assemble using your own discretion. The assembly of the hinges takes practice and is difficult, use an Awl or small pin to align the washers, be careful and always grease the needle bearing before assembly.

ASSEMBLY INSTRUCTIONS

1. INSTALL FIRST SNAP-RING (5) ON HINGE SHAFT (6)
2. INSTALL 4 BRONZE FLANGE BUSHINGS (3) IN C-HINGE (1)
3. GREASE BEARINGS IN E-HINGE (2) WITH LUBER-PLATE
4. NOTE LOCATIONS OF LOAD WASHERS FIG. (4) AND USE ONE OR MORE AS REQUIRED
5. ASSEMBLE C-HINGE (1) AND E-HINGE (2) WITH HINGE SHAFT (6) USING LOAD WASHERS TO REMOVE SIDE PLAY
6. SECURE ASSEMBLY WITH FINAL SNAP RING (7)

CAUTION

DO NOT USE ANY SET SCREWS



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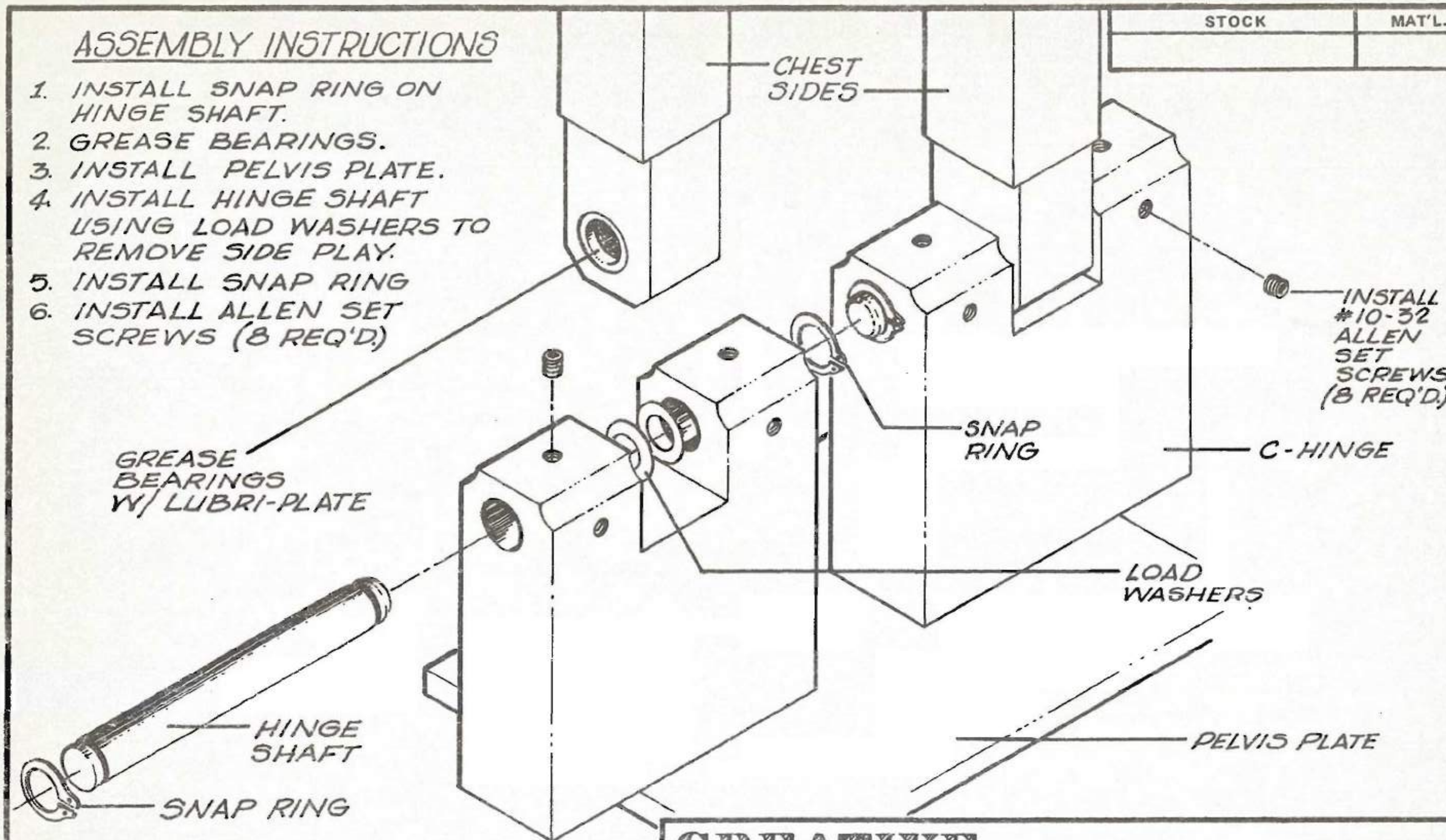
REVISIONS		
REV	DATE	BY

SCALE: FULL
DATE: 6·21·82
APPROVED BY: [signature] DATE: 8-10-82
DRAWN BY: FN
CHK'D. BY:
ITEM: E-HINGE RETRO-FIT
TOLERANCES: FRACT'L. ± .020 DECIMAL .xx ± .015 .xxx ± .005
DESCRIPTION: ASSEMBLY PROCEDURE
DRAWING NUMBER: 3-035

STOCK	MAT'L.

ASSEMBLY INSTRUCTIONS

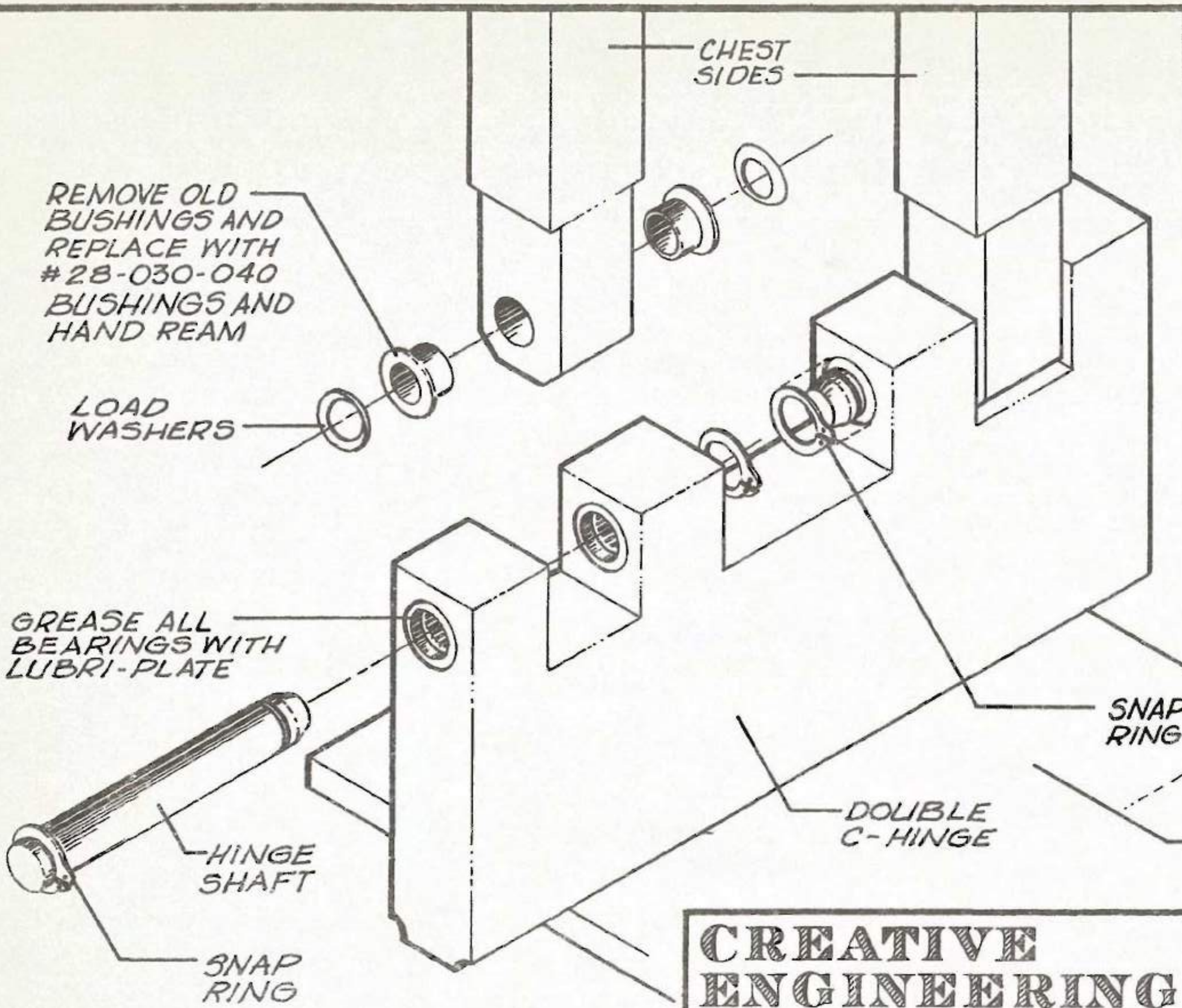
1. INSTALL SNAP RING ON HINGE SHAFT.
2. GREASE BEARINGS.
3. INSTALL PELVIS PLATE.
4. INSTALL HINGE SHAFT USING LOAD WASHERS TO REMOVE SIDE PLAY.
5. INSTALL SNAP RING
6. INSTALL ALLEN SET SCREWS (8 REQ'D.)



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SCALE: ——	APPROVED BY Jw2	DATE 8-10-82	DRAWN BY FN
DATE: 7·1·82			CHK'D. BY
ITEM: CHEST TO MOUNTING PLATE - RETRO-FIT			TOLERANCES FRACT'L. ± .020 DECIMAL .xx ± .015 .xxx ± .005
DESCRIPTION: ASSEMBLY			DRAWING NUMBER 3-036



ASSEMBLY

1. INSTALL SNAP RING ON HINGE SHAFT.
2. GREASE BEARINGS.
3. INSTALL PELVIS PLATE.
4. REMOVE OLD BUSHINGS FROM CHEST SIDES AND REPLACE WITH NEW #28-030-040 AND HAND REAM.
5. INSTALL HINGE SHAFT USING LOAD WASHERS TO REMOVE SIDE PLAY.
6. INSTALL FINAL SNAP RING.

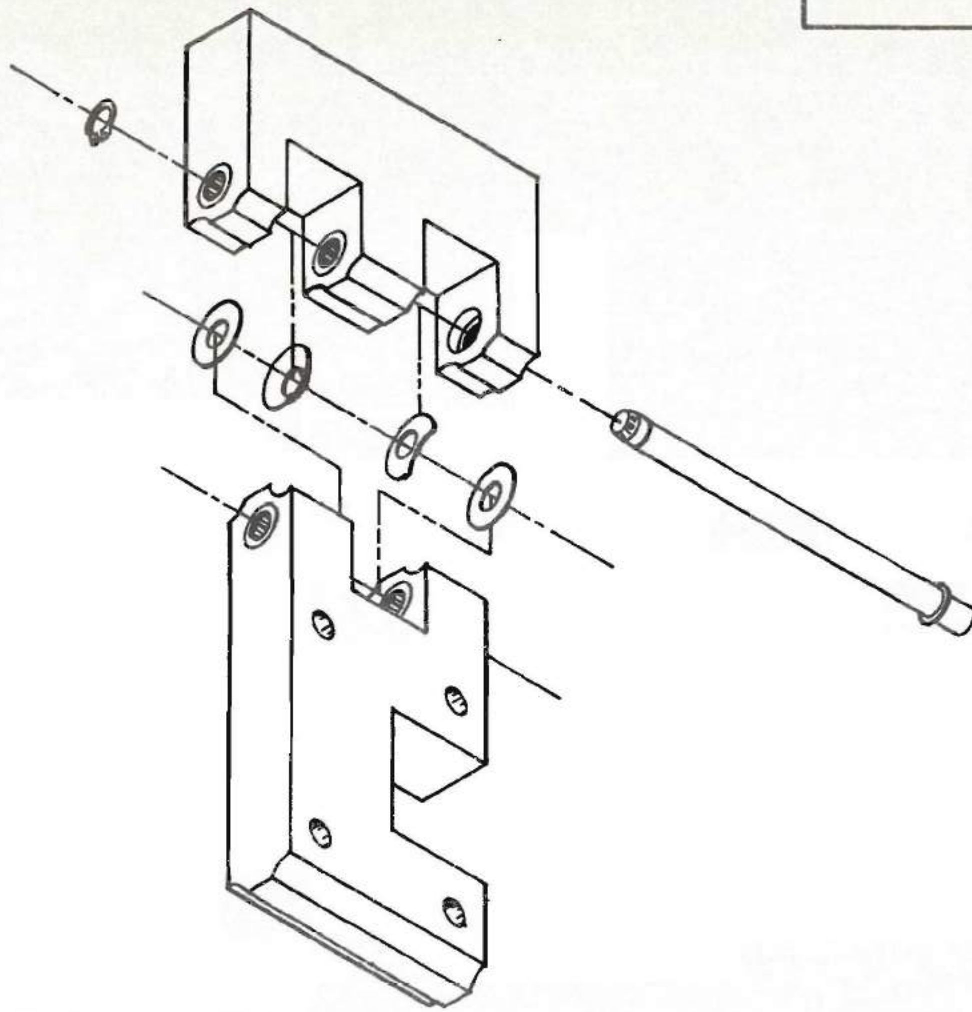
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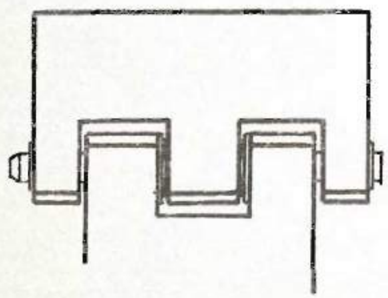
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DATE: 7-2-82	[signature]	8-10-82	CHK'D. BY
ITEM: CHEST MOUNTING PLATE - RETRO-FIT			TOLERANCES FRACT'L. ± .020 DECIMAL .xx ± .015 .xxx ± .005
DESCRIPTION: ASSEMBLY			DRAWING NUMBER 3-037

REVISIONS		
REV.	DATE	BY

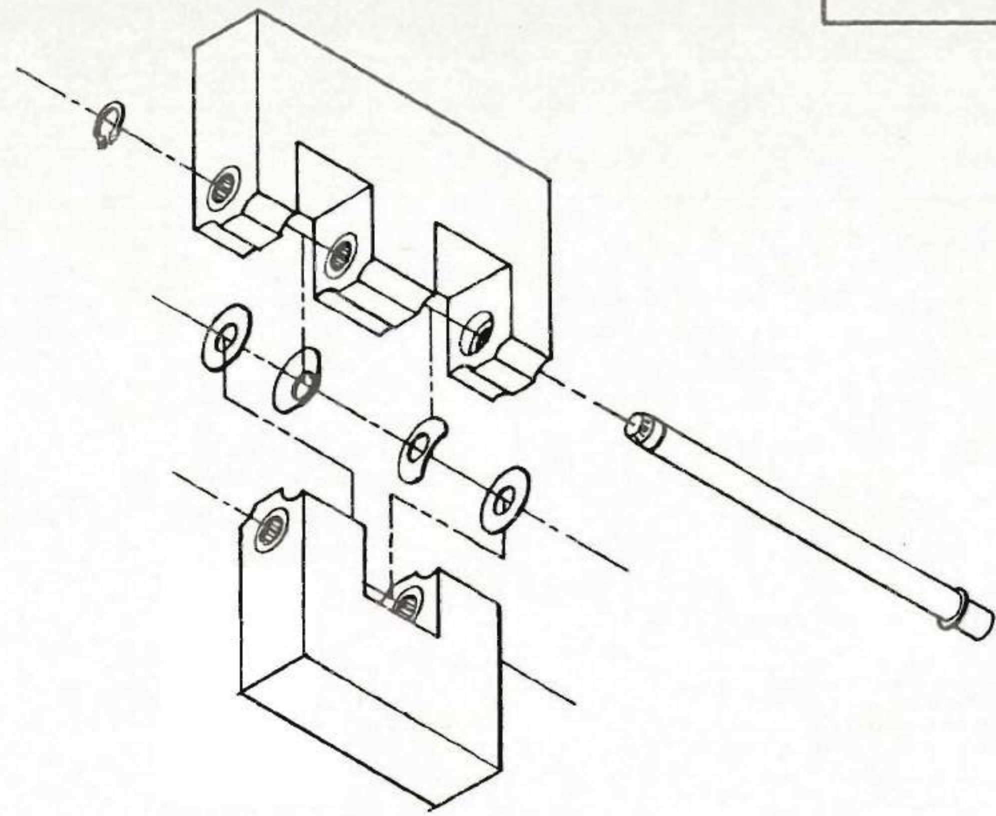
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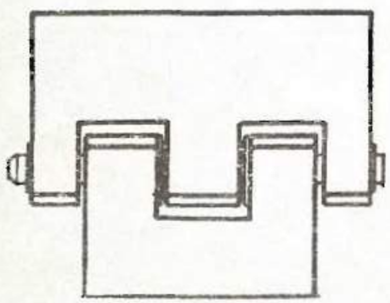




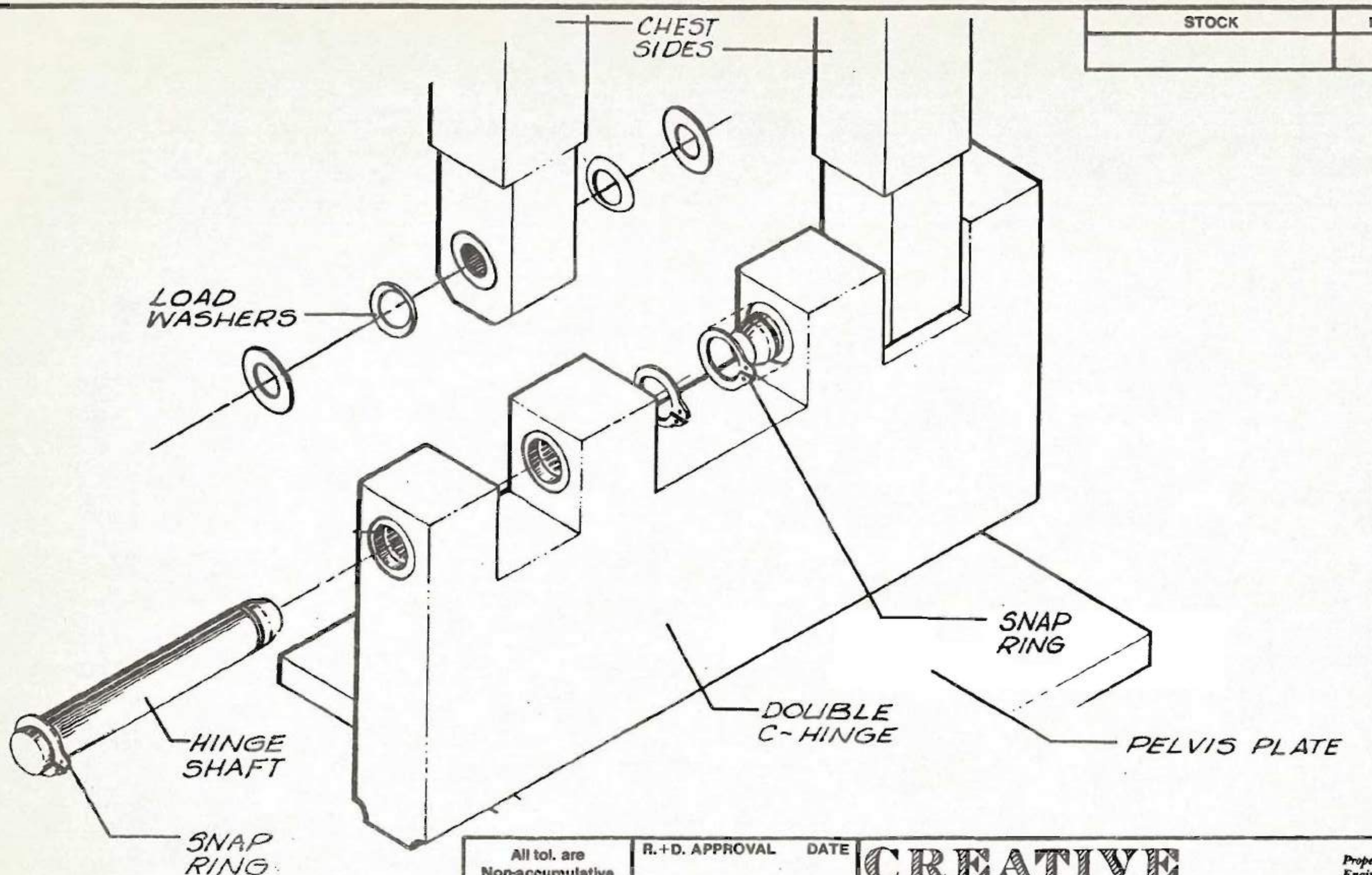
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REV. / DATE / BY			DATE: 9·8·83	CHK'D. BY	
	ITEM: ASSEMBLY DWG. K-HINGE TO E-HINGE			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L:			DRAWING NUMBER 3-038	

STOCK	MAT'L.



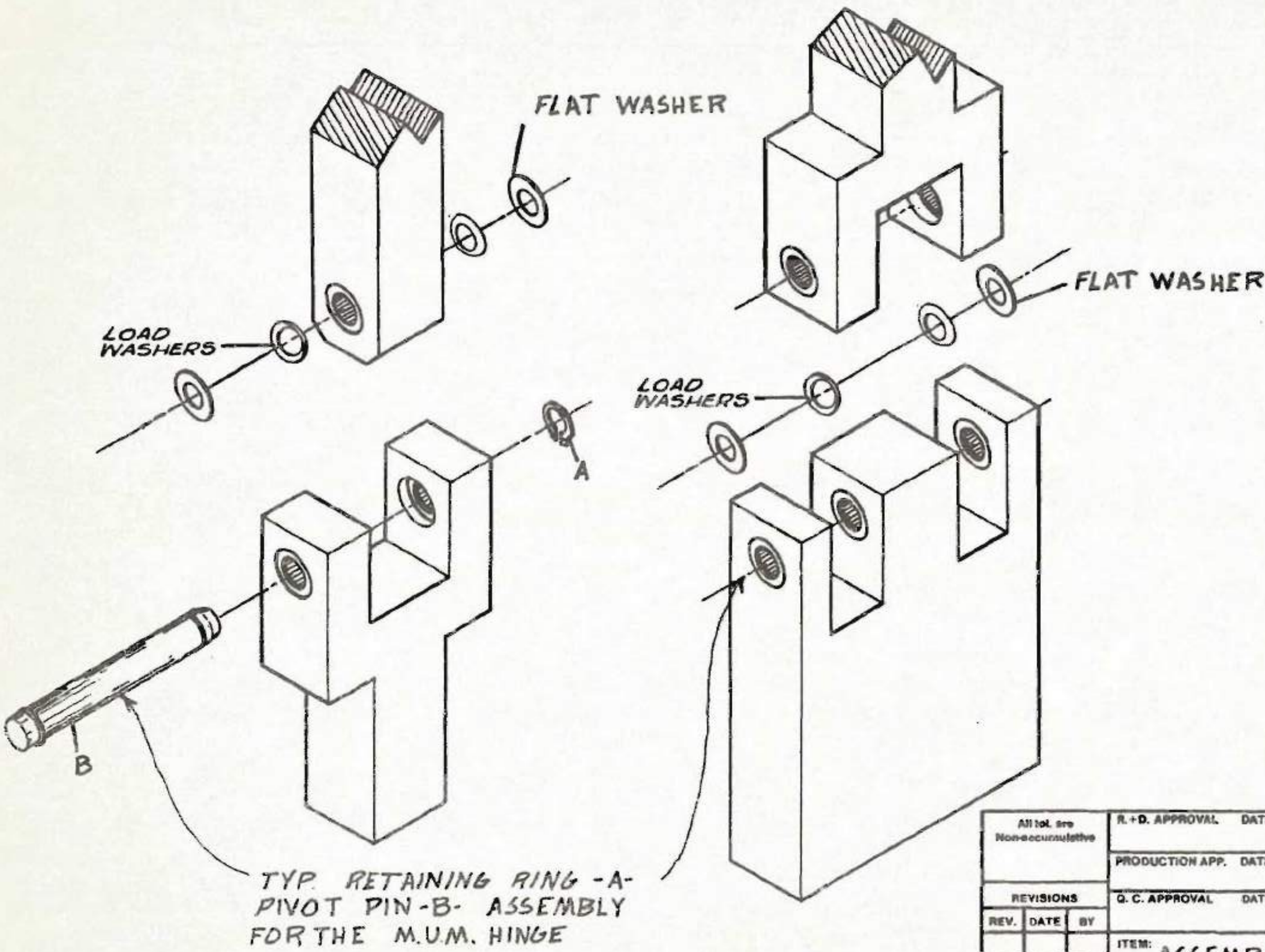


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REV. / DATE / BY			DATE: 9·8·83	CHK'D. BY	
	ITEM: ASSEMBLY DWG. E-HINGE TO C-HINGE			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L:			DRAWING NUMBER 3-039	



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REV. / DATE / BY		DATE: 9·8·83 / CHK'D. BY
	ITEM: ASSEMBLY DWG. CHEST FRAME TO PELVIS HINGE	UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:	DRAWING NUMBER 3-040



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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS + .010	SCALE:	DRAWN BY	
REV. DATE BY			DATE: 9·8·83	CHK'D. BY	
	ITEM: ASSEMBLY DWG. MALE-UNI-MOUNT TO FEMALE MOUNT			UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L: FEMALE-UNI-MOUNT TO STUD			DRAWING NUMBER 3-041	

The Head

Description: The following text deals with the basic head and the movements, Eye turn, Eye lid, Mouth and Ears. There are drawings at the back of the text depicting the movements in the head, (Pages 3-045 and 3-046) use these drawings for reference only. Critical adjustments on each movement will vary with each character, so after doing any repair work refer to Pages 3-094 thru 3-135 and set the Critical Adjustments. All part numbers are available in the Parts Catalog.

A. If the head must be removed from the character to replace or rebuild the hinge:
   1. Label the air lines attached to the cylinders, then cut off or pull off the lines. Make sure the air lines are labeled so that they can be reattached properly.

   2. Detach the Head Up, Down cylinders front mount, and the Head Tip Cylinders front mount as required to free the head.

   3. Unscrew the E-Hinge at the T-Top of the neck shaft. Only disassemble a hinge while it is still attached to the character if absolutely necessary. (It is best to work with the part in a vise)

B. The eyes left, right and ear movements use Clippard cylinders. They are not repairable and must be replaced if bad.
   1. The front and rear mounts of these type cylinders have been attached using two different ways, some using 1/8" Dowel Pins and Shaft Collars, now we use 1/8" x 3/4" Cotter Pin Part # 28-045-957.

   2. Bend the Cotter pins closed, or loosen the Shaft Collars and remove the cylinder.

   3. Cut or pull off the air lines to the old cylinder. Attach them to the new cylinder. Pull and re-attach the lines one at a time so you don't get them mixed up.

   4. Re-attach the new cylinder to the front and rear mounts using a 1/8" x 3/4" Cotter Pins, set the critical adjustments. (Pages 3-094 thru 3-135)

C. If an eyeball must be replaced because it was damaged:
   1. Squeeze the sides of the plastic Eye Lid together, and remove the eye lid from its pivot pins.

   2. Loosen the 2 Shaft Collars and pull out the eyeball and the pressed pin from the top. You may have to pry out the eyeball, use a screw driver. If you want to reuse the eye ball, wrap the tool with a soft cloth or a piece of leather to protect the eye ball from getting scratched.

   3. When replacing the eyeball note the 3, 5/16" bronze washers between it and the eye mount plate. Do not tighten the 2 shaft collars, they will need to be loose for critical adjustments.

   4. Never disassemble the eye linkage, there is no reason to and it will only cause problems latter on.

D. If a eye lid must be replaced:
   1. Pull the fas-pin cylinder front mount, and remove the old eye lid by squeezing the sides together and pulling the eye lid from its pivot points.

   2. Attach the new eye lid to its pivot pins, just squeeze the sides together and allow it to snap into place.

   3. Check the alignment of the cylinder to the eye lid, they should attach together easily. If the alignment is off, loosen the 2 shaft collars at the cylinder rear mount, and align the parts.

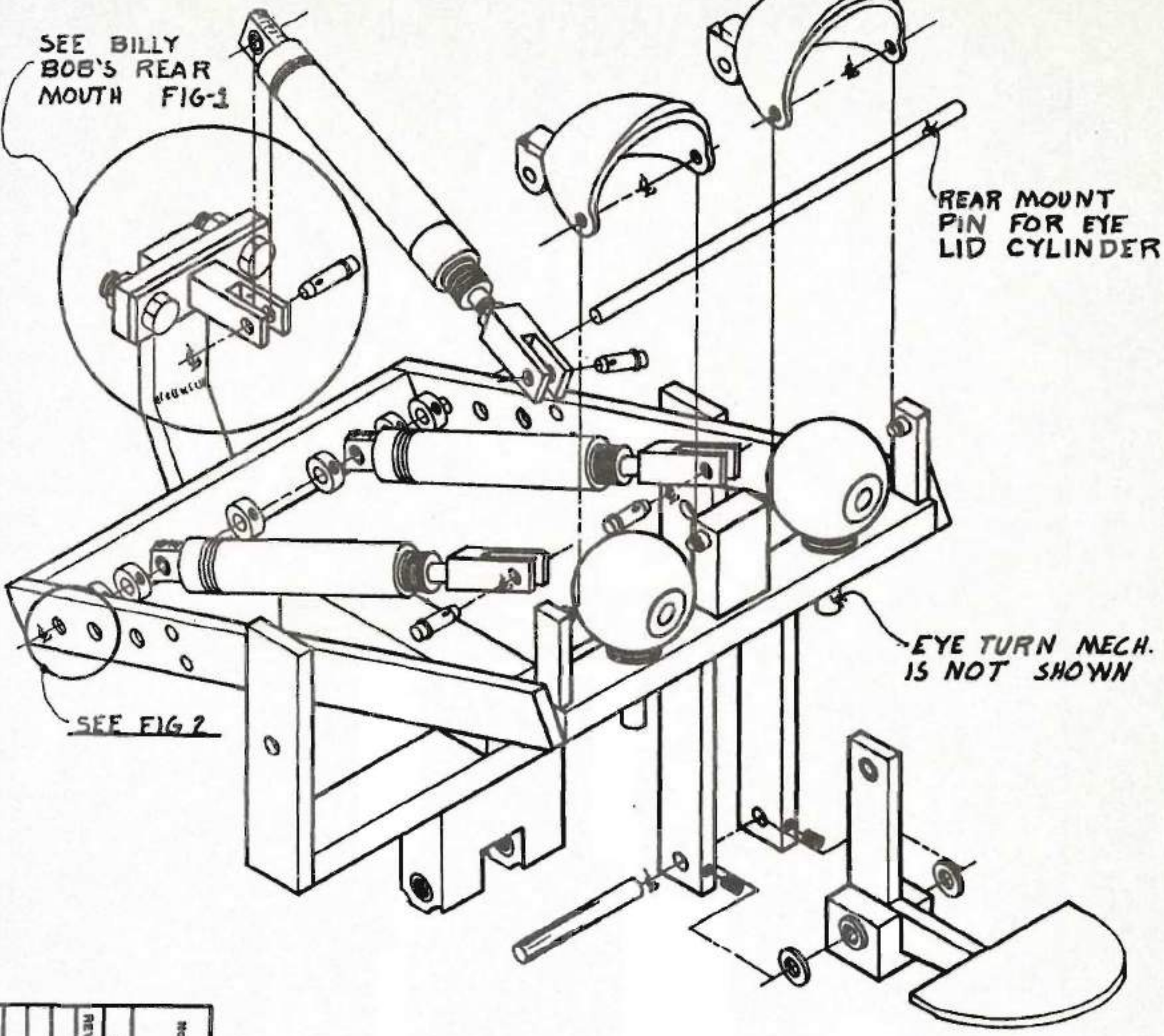
   4. Re-attach the cylinder front mount to the eye lid using the fas-pin removed in step 1, check the critical adjustments.

E. Problems in the mouth: There are 3 types of mouths used in the show; Billy Bob's mouth cylinder rear mount is different from the rest, and Earl's mouth is typical only to Earl. The mouth will have very few problems, the biggest being that the corners of the latex mask crack from the mouth opening too wide. If the mouth is adjusted so that it is fully closed when the cylinder is fully closed, this problem will be minimized. (See Critical Adjustments Pages 3-094 thru 3-135) If for any reason the mouth or mouth cylinder must be removed, remember to note the disassembly steps you followed.

F. If any of the cylinders must be rebuilt refer to Pages 3-009 thru 3-011, and all drawings referred to by that text.

G. If the C-Hinge welded to the head must be replaced, a complete rebuilding of the head is required.
   1. Start with the eye turn mechanism. Remove one part at a time and place it on the new head.
   2. Disassemble and re-assemble the eye lid mechanism next, one part at a time.
   3. Disassemble and re-assemble the mouth mechanism next.
   4. Do the ear mechanism last. Remember one part at a time.
   5. Refer to Critical Adjustments Pages 3-094 thru 3-135, and set all the adjustments.

H. For a drawing of Earl's Head and instructions refer to page 3-047.



Note: Assembly of Billy Bob's mouth cylinder, rear mount. Set Screws holes -A- are not used in this assembly.

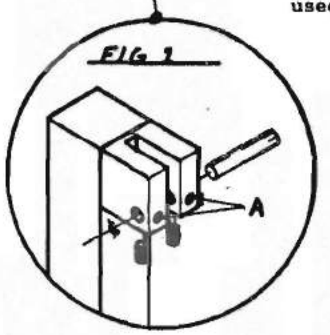


FIG 1

Note: The Eye Lid Cylinders rear mount pin Holes. Hole -B- is used with a 2" stroke Eye Lid Cylinder. Hole -C- is used with a 1" stroke Eye Lid Cylinder.



FIG 2

All tol. are Non-accumulative

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Q.C. APPROVAL DATE

ITEM: ASSEMBLY DWG. TYP HEAD EYE LID AND MOUTH ONLY

MAT'L:

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SCALE:

DATE: 9-12-83

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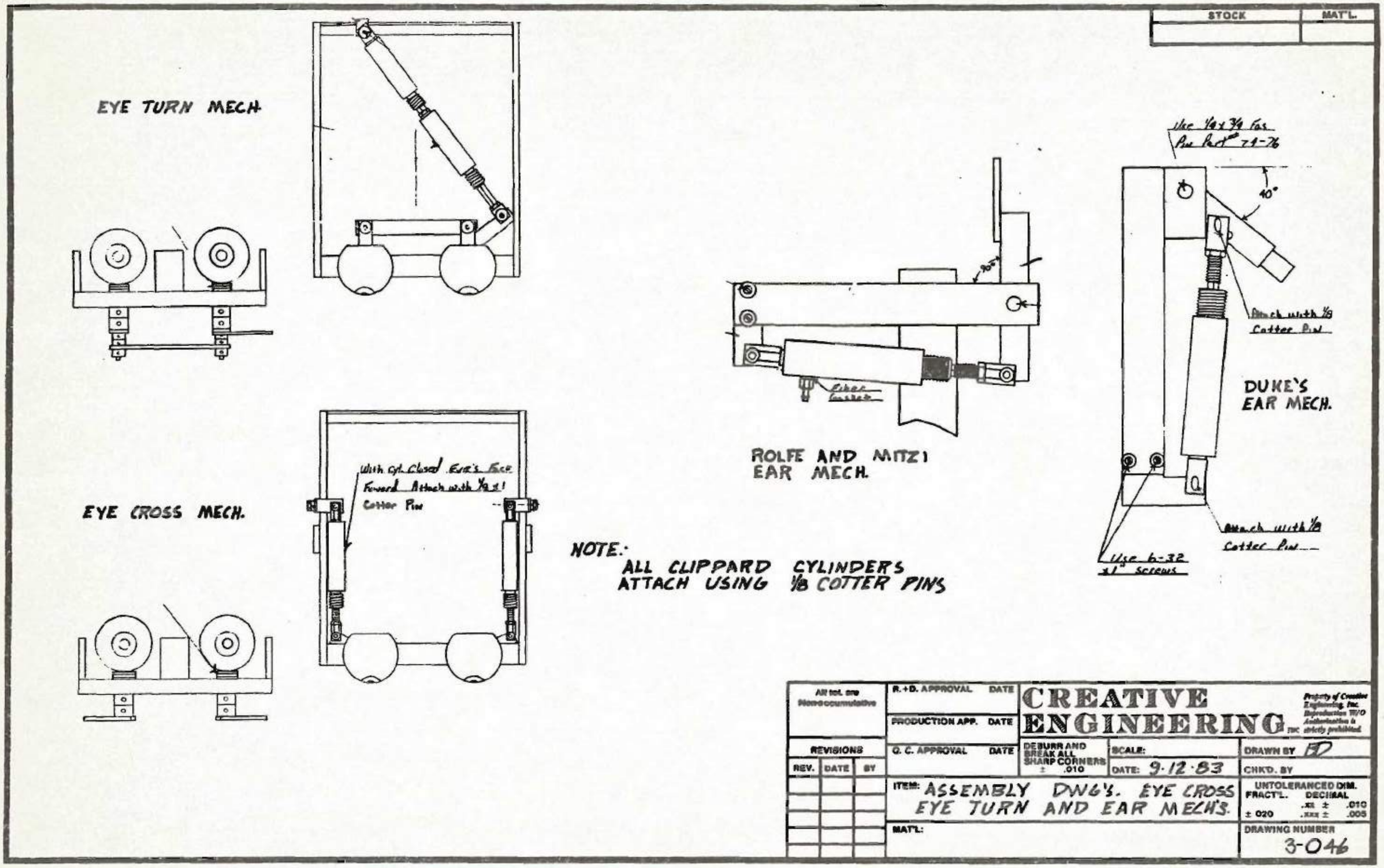
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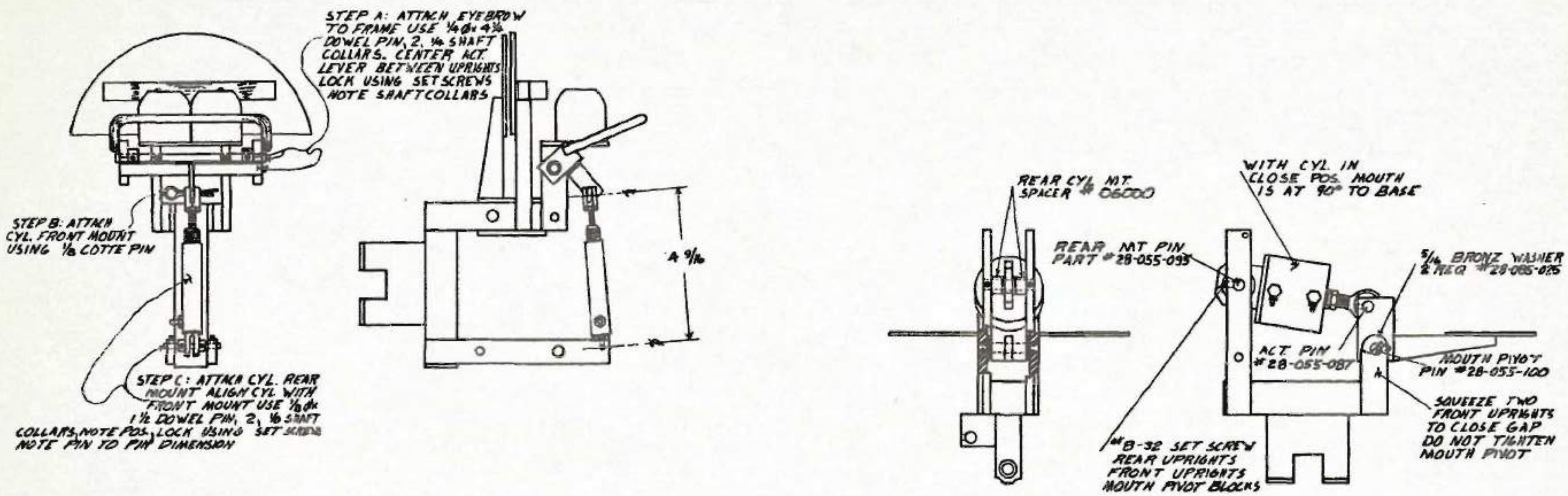
UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .XX ± .010 .XXX ± .005

DRAWING NUMBER 3-045

STOCK

MAT'L.


STOCK
MAT'L.
EYE TURN MECH
EYE CROSS MECH.
With Cyl. Closed Eye's Face Forward. Attach with 1/8 x 1 Cotter Pin
NOTE:
ALL CLIPPARD CYLINDERS
ATTACH USING 1/8 COTTER PINS
ROLFE AND MITZI
EAR MECH.
90°
Use 1/4 x 3/4 Fas. Per Part# 71-76
40°
Attach with 1/8 Cotter Pin
DUKE'S
EAR MECH.
Attach with 1/8 Cotter Pin
Use 6-32 x 1" Screws
All tol. are Noncumulative
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PRODUCTION APP. DATE
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DEBURR AND BREAK ALL SHARP CORNERS ± .010
SCALE:
DATE: 9·12·83
DRAWN BY FD
CHKD. BY
ITEM: ASSEMBLY DWG'S. EYE CROSS EYE TURN AND EAR MECH'S.
MAT'L:
UNTOLERANCED DIM.
FRACT'L. ± .020
DECIMAL .xx ± .010 .xxx ± .005
DRAWING NUMBER
3-046



STOCK	MAT'L.

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REV. / DATE / BY	Q. C. APPROVAL / DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE: / DATE: 9-12-83	CHK'D. BY
	ITEM: ASSEMBLY DWG. EARL'S EYE LID AND MOUTH		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-047

The Chest

Description: The following text deals with the chest and the movements there in: Head Left/Right, Head Tilt, Head Up/Down and Guitar movements. There are drawings at the back of the text depicting the movements contained in the Chest, use these drawings for reference only. Critical adjustments on each movement will vary with each character, so after doing any repair work refer to Pages 3-094 thru 3-135, and set the Critical Adjustments. All part numbers are available in the Parts Catalog.

A. There are 3 styles of Head Left/Right Actuation Levers (Front Mount) used in the field. One old style is a clevis type mount where a shaft collar is welded to a steel plate. After the part was assembled onto the neck shaft, it and the neck shaft were drilled and pinned using a 1/8" or 3/16" x 1 1/4" long Roll Pin. The other old style is a machined steel part with a Rod End type front mount, that was also drilled and pinned using a Roll Pin. The problem with the old styles is the Roll Pin shears off, if the set screw in the Actuation Lever loosens. So if you have an old style Head Left/Right front mount, keep a close watch on the set screws. If the Roll Pin does shear off, it is suggested that you replace it with the new style front mount. (Part # M07420) It is a clamp on type that does not use a Roll Pin and will have fewer problems. If it is decided to repair the old one:

1. Detach the cylinder's front mount from the Actuation Level. The front mount is either a clevis or Rod End type, and is attached using a Fas-Pin, or a Dowel Pin and Shaft Collars.

2. Loosen the set screw in the Actuation Lever in question, and align the holes drilled through the Neck shaft and Actuation Lever.

3. Tap out the broken Roll Pin, using a Drift Punch and Hammer.

4. Attempt to tap in the same size roll pin as the one previously removed. If the hole is over size and the pin fits in sloppy, drill the hole for the next size roll pin. If the old one was a 1/8" Roll Pin, drill a 11/64" Hole and press a 3/16" Roll Pin. Drill the hole 1/64" under the size of the Roll Pin you are using.

B. To replace the upper (Head Right) or lower (Head Left) Actuation lever: (See Drawings Pages 3-054 and 3-055)

1. Detach the cylinder from the Actuation lever and loosen the set screws. Align the hole through the neck shaft and Actuation Lever, then tap out the broken Roll Pin using a Center Punch and Hammer.

2. Note the location of the Head Up/Down or Head Tilt rear mounts inside the Aluminum chest frame.

3. Loosen any parts inside the chest frame that will prevent you from lifting the head and neck shafts.

4. Cut the Cable Ties used to hold the hose plumbing harness against the chest frame. Do Not cut open the hose plumbing harness. Beware of cutting air lines in the harness.

5. Lift the head and neck shaft high enough to slip the Actuation Lever from under the upper or lower neck shaft.

6. Remove the old Actuation Lever and replace it with the new one, in one step.

7. Exchange the cylinder's front mount for a 5/16" Male Rod End (Part #28-065-027). If a 5/16" Rod End is already attached, check it for wear. The ball should not move back and forth inside the race, replace it if necessary.

8. Attach the front mount of the cylinder to the Actuation Lever using a 5/16" x 11/16" Aircraft Bolt (Part #28-016-012) and a 5/16" Self Locking Nut (Part #28-018-010).

9. Refer to Pages 3-094 thru 3-135 (Critical Adjustments) and set the adjustments, before tightening the Actuation Lever into place.

C. If the welded aluminum chest frame must be replaced due to a broken weld or aluminum part: (See Drawing Page 3-054)

1. Disassemble and re-assemble the parts one step at a time. Note the steps taken and note the location of the Head Up/Down or Head Tilt rear mounts.

2. Separate as few parts as possible. (Don't pull the air lines from the cylinders, leave the head attached to the neck shaft.)

3. Clean all the parts. You may also want to rebuild the cylinders at this time. (See Pages 3-009 thru 3-011, and all drawings referred to by that text)

4. Re-assemble the parts and set all critical adjustments (See Pages 3-094 thru 3-135)

D. Very few problems should be found in the Head Up/Down movements. If a problem does arise and repair or replacement of a part is called for, remember to note the critical adjustments and steps you followed to disassemble.

E. Problems in the Fatz Head Tilt mechanism: (See Drawing page 3-056)

1. The most common problem in Fats Head Tilt mechanism is that the cylinder's rear mount pin breaks. If the pin breaks, replacement of the welded steel carrier is required.
   a. Detach the Head Tilt cylinders from the character.
   b. Detach the Head Up/Down cylinder's front mount (A).
   c. Unbolt the Head Tilt E-Hinge (B) from the carrier, and remove the head from the character.
   d. Remove the 2 bolts (C), attaching the carrier to the steel block (D) that is welded to the neck shaft.
   e. Re-attach the new carrier to the steel block (D), using the hardware previously removed.
   f. Re-attach the Head Up/Down and Head Tilt cylinders.
   g. Set the critical adjustments. (See Pages 3-094 thru 3-135)

2. If Fatz Head Tilt cylinder's front mount pin breaks: (See Drawing Page 3-056)
   a. Remove the old pin from the aluminum block (E), that is welded to the head frame. You may have to drill a hole through the back of the block (E) to remove the pin, (if a hole must be drilled to remove the pin).
   b. Measure and note the location of the broken pin inside the block (E).
   c. Measure and mark the center lines of the hole to be drilled.
   d. Cover any cylinders in the area with a rag to prevent chips from getting in the cylinder. Using a 1/8" drill, make your hole through the back of the block (E).
   e. Push out the old pin, replace with the new pin and re-assemble the cylinder to the head.

F. The problems in the Guitar Rock and Hand Slide movements are mostly caused by improperly adjusted critical angles or the fiberglass body is mounted too far forward allowing it to interfere with the movements. The Guitar Rock movement is covered first in the text. (See Drawing Page 3-057)

1. The rear mount of the Guitar Rock Cylinder is attached to a aluminum block (A) welded to the chest, using a 1/2" Dowel Pin (B). The Dowel Pin is held in the block using 1/4"-20 x 1/2" set screws. If the set screws are allowed to loosen in the block (A) or the bushing in the cylinder is worn, the 1/2" hole in the block could become elongated, if this happens replacement of the welded chest frame is required. So keep a close watch on these set screws during P.M. of the show. If the set screw hole becomes oversized or the threads are striped, drill out and tap the hole to the next larger set screw size. (5/16"-18) To replace the rear mount bushing in the cylinder, or to rebuild a damaged cylinder refer to Pages 3-009 thru 3-011, and all drawings referred to by that text.

2. The front mount of the Guitar Rock Cylinder is attached to the Actuation Lever (C) using a 3/8" Fas-Pin. The Actuation Lever (C) is welded to a double shaft collar. The shaft collar is attached to the twist shaft (D) using set screws and the shaft collar is drilled and pinned, to the twist shaft, using a 3/16" Roll Pin. If the Roll Pin breaks it is probably due to the set screws being loose, watch them closely during P.M. To repair a broken Roll Pin:
   a. Loosen the set screws in the double shaft collar. Pull the Fas-Pin cylinder front mount, align the holes through the collar and the twist shaft (D).

   b. Tap out the broken Roll Pin using a small pin and hammer.

   c. Attempt to tap in a new Roll Pin the same size as the broken one. If the hole is over size and the pin fits in sloppy, you will need to re-drill the hole for the next size larger Roll Pin. Align the holes and re-drill the hole 1/64" below the size of the Roll Pin you want to use. Note: If the hole must be enlarged bigger than 1/4", it is suggested to replace the Actuation Lever (C) and the twist shaft (D).

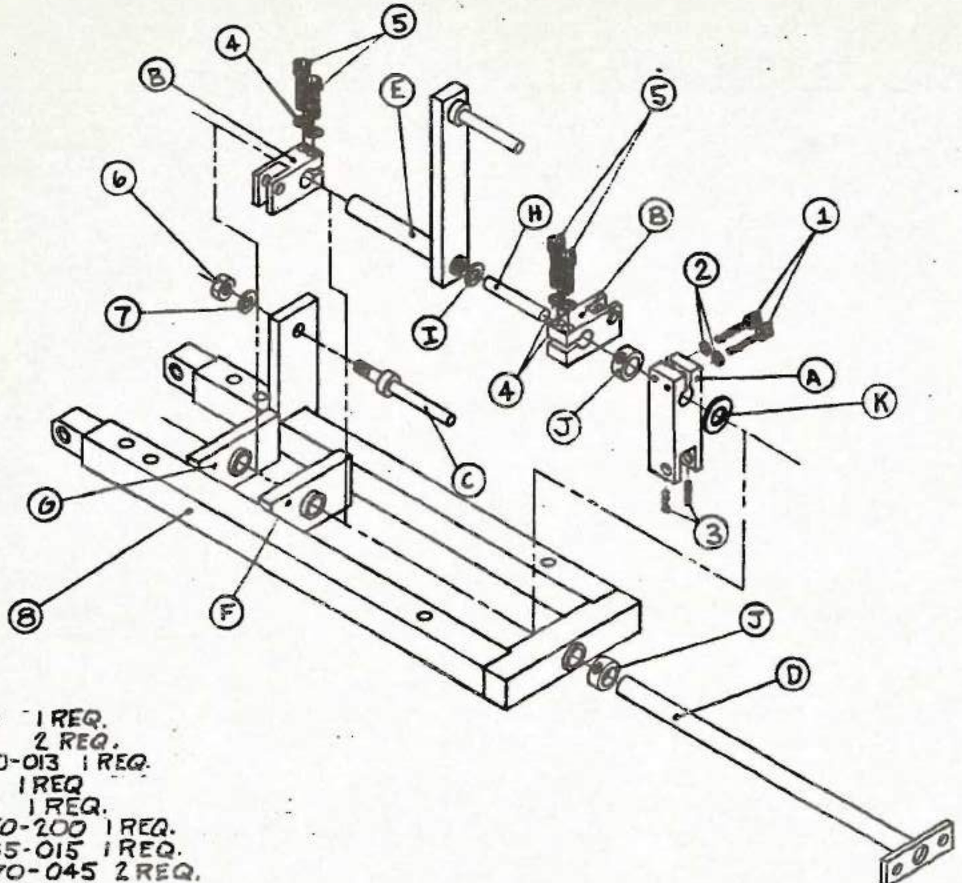
3. If the bushing pressed into the Actuation Lever (C), is over size and must be replaced:
   a. Removal of the actuation lever is not required. Tap out the old bushing using a 7/16" pin and hammer.

   b. The bushing used in the Guitar Rock Actuation Lever is a 3/8"I.D. x 1/2"O.D. x 1/2" long bushing. (Part #28-032-020) Tap in the new bushing using a hammer. Place a piece of wood on top of the bushing, so that you don't damage it when taping it in. If you cannot get a good press, try marring the hole with a Awl, if this does not work replace the part.

4. Another thing to go wrong with the Guitar Rock movement is, the 5/8" Pillow Block Bearing (E) breaks. This is usually caused by the adjustment on the Actuation Lever (C) being off. If pillow blocks break check the critical adjustment. (See Pages 3-094 thru 3-135) For any broken or worn parts that need replacing in the Guitar Rock movement follow the steps described below, part numbers are available in the Parts Catalog.
   a. Label and pull the Air lines attached to the Hand Slide movement cylinder in the Guitar.
   b. Detach the guitar from the guitar mount plate (F), and place it to the side.
   c. Pull the Fas-Pin in the Guitar rock cylinder's front mount.
   d. Tap out the Roll Pin in the Actuation lever, using a steel pin and a hammer.
   e. Loosen the set screws in the Pillow Blocks (E) and the Actuation Lever (C), and pull the twist shaft from the assembly.
   f. Unbolt and remove the broken Pillow Block (E), and re-attach the new block using the same bolts previously removed.
   g. Check the twist shaft (D) to see if it is bent. File off any burs on the twist shaft.
   h. Re-assemble the mechanism, re-attach the guitar and air lines. Don't forget to tighten all set screws and tap back in the Roll Pin, set the critical adjustments.

5. The Hand Slide movement (See Drawing Page 3-058) is a simple push-pull type mechanism. Most of the recorded problems in this movement are caused because the mechanism is located on the outside character and is more easily damaged. The newer Guitars will have two Shaft Guide Blocks (D). The older Guitars use only one Shaft Guide Block (D), welded to the neck, near the end of the neck.

6. One problem, which may happen to the Hand Slide movement, is that the guide shaft (A) may become misaligned and may not operate smoothly. Their are two causes of shaft misalignment: one, is that the wooden mounts in the fiberglass guitar warp and will eventually bend the aluminum neck of the guitar. Two, the rear end of the cylinder will catch on the fur when the Guitar Rock movement is in operation. This is usually caused by the critical adjustments being off or the fiberglass body being mounted too far forward. To discover if the problem is with the fiberglass body being to far forward, manually operate the Guitar Rock movement and see if the cylinder is touching the body. If it is to far forward, refer to Pages 3-136 thru 3-187 Cosmetics, and mount the body correctly. Next move guide shaft (A). If the shaft does not move smoothly and easily, due to either reason described above, it needs to be repaired.
   a. Label the air lines to the hand slide cylinder and pull them.
   b. Detach the the guitar from the mount plate (B). Save the bolts, note the mount holes and bring the guitar to the Technical Room.
   c. Remove the fiberglass guitar from the mechanism and place it to the side, put it where it won't get scratched.
   d. Try the mechanism again, if it works properly, the problem is that the wood mount pieces in the fiberglass guitar have warped. Plane the wood pieces or shim the mounting screws. After it works re-assemble the guitar back on to the character.
   e. Did the mechanism not work properly when you tried it again? If not, place an Adjustable Wrench at the end of the aluminum guitar neck and twist it one way or the other to try to straighten the neck and get the movement working properly. If this works, the wood mount pieces in the fiberglass guitar have warped and bent the neck, plane them or shim the mounting screws when re-attaching the fiberglass guitar.
   f. If the rear end of the cylinder caught on the fur, the front cylinder mount piece (C) has bent. Place an Adjustable Wrench on it and try to bend it back so the movement functions.
   g. If the Guide shaft has misaligned, rebuilding of the cylinder is required. (See Pages 3-009 thru 3-011, and all drawings referred to by that text)
   h. After the mechanism works properly, re-attach the guitar to the character, and set all critical adjustments.

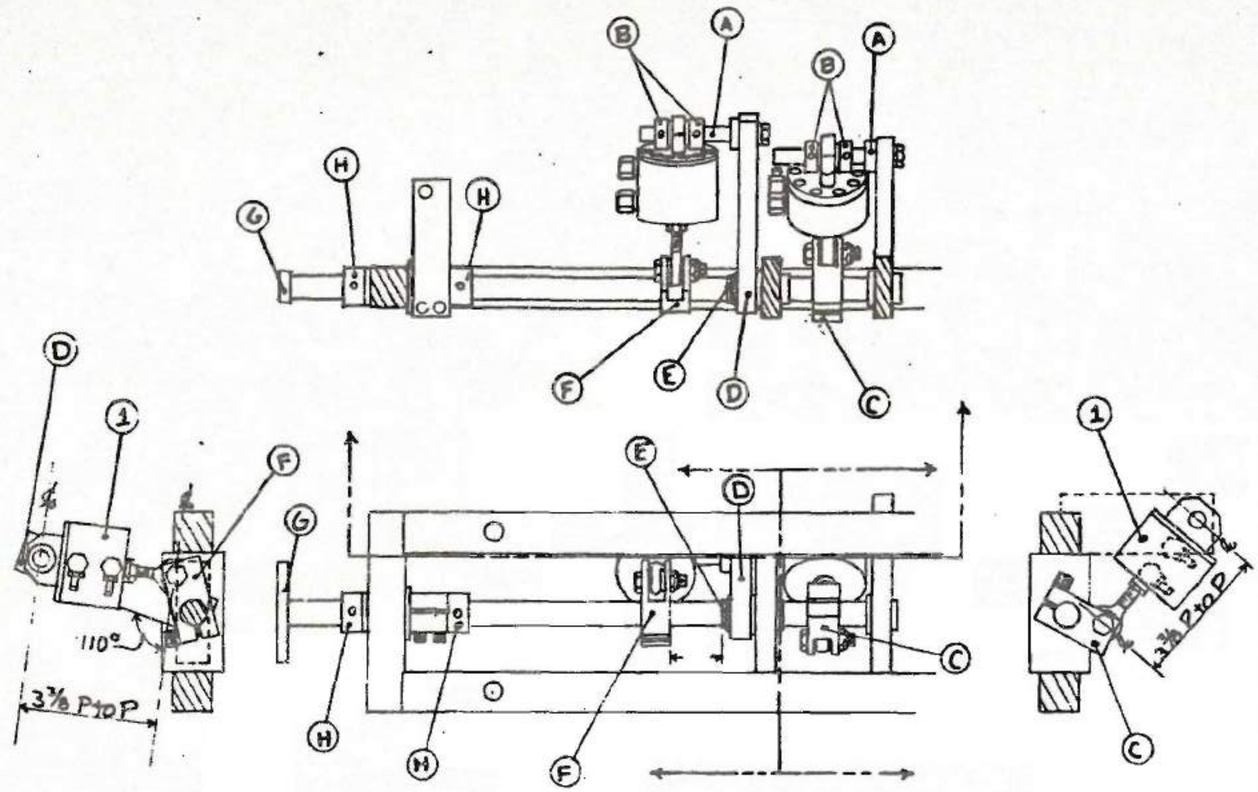


A: #10020 1 REQ.
B: #07420 2 REQ.
C: #28-050-013 1 REQ.
D: #11490 1 REQ
E: #11530 1 REQ.
H: #28-050-200 1 REQ.
I: #28-085-015 1 REQ.
J: #28-070-045 2 REQ.
K: #06743 1 REQ.
1: #10-32 x 1 CAP SCREW 2 REQ.
2: #10 LOCK WASHER 2 REQ.
3: #8-32 x 1/4 SET SCREW 2 REQ.
4: 1/4 LOCK WASHER 4 REQ.
5: #28-045-971 4 REQ.
6: 3/8-24 NUT 1 REQ.
7: 3/8 LOCK WASHER 1 REQ.
8: #16985 1 REQ

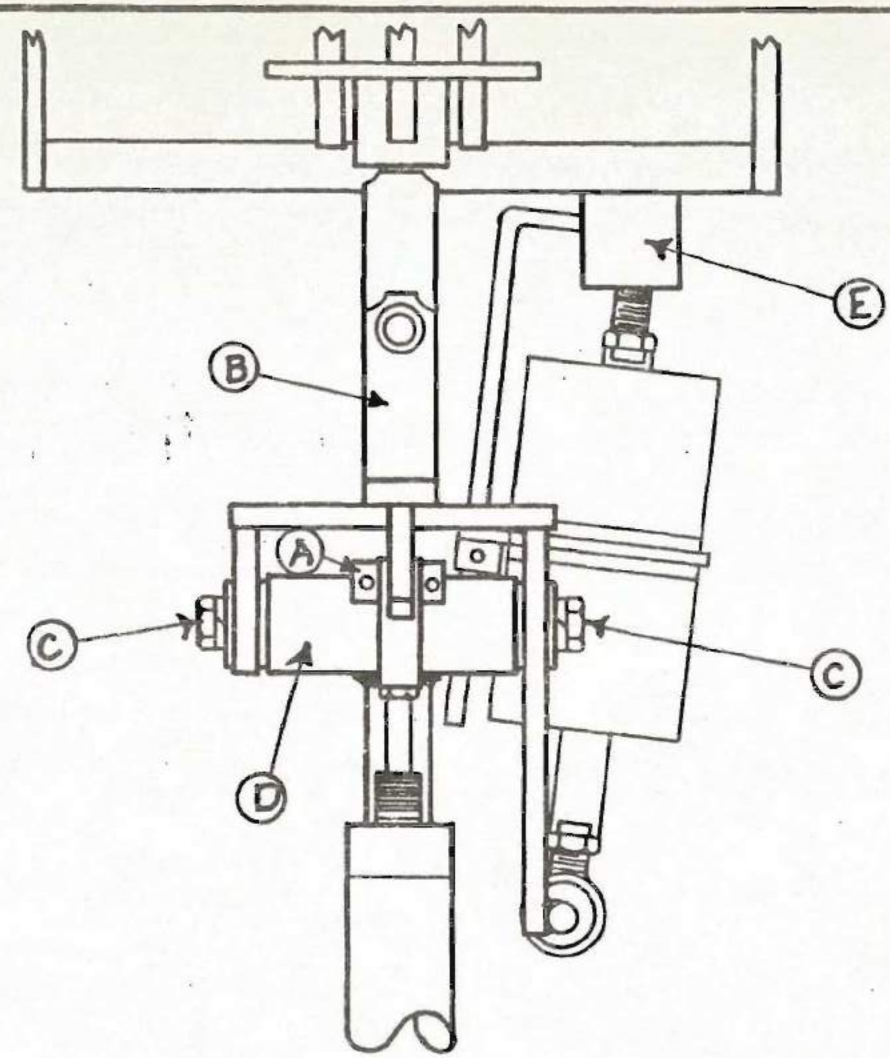
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			ITEM: EXPLODED VIEW TYPICAL CHEST ASSEMBLY			UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
			MAT'L:			DRAWING NUMBER 3-054

STOCK	MAT'L.

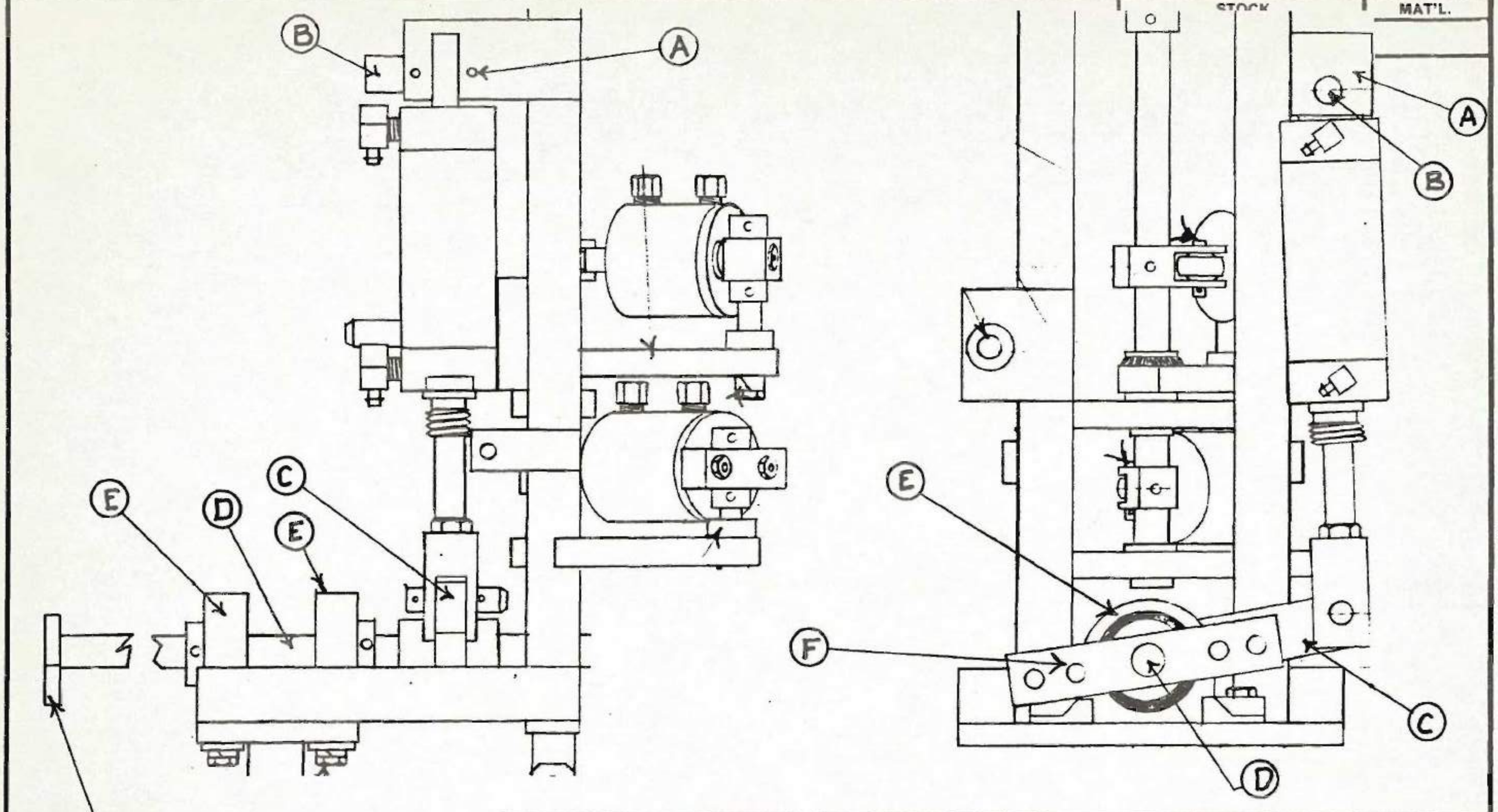


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REV. / DATE / BY	ITEM: TYPICAL CHEST ASSEMBLY			UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-055



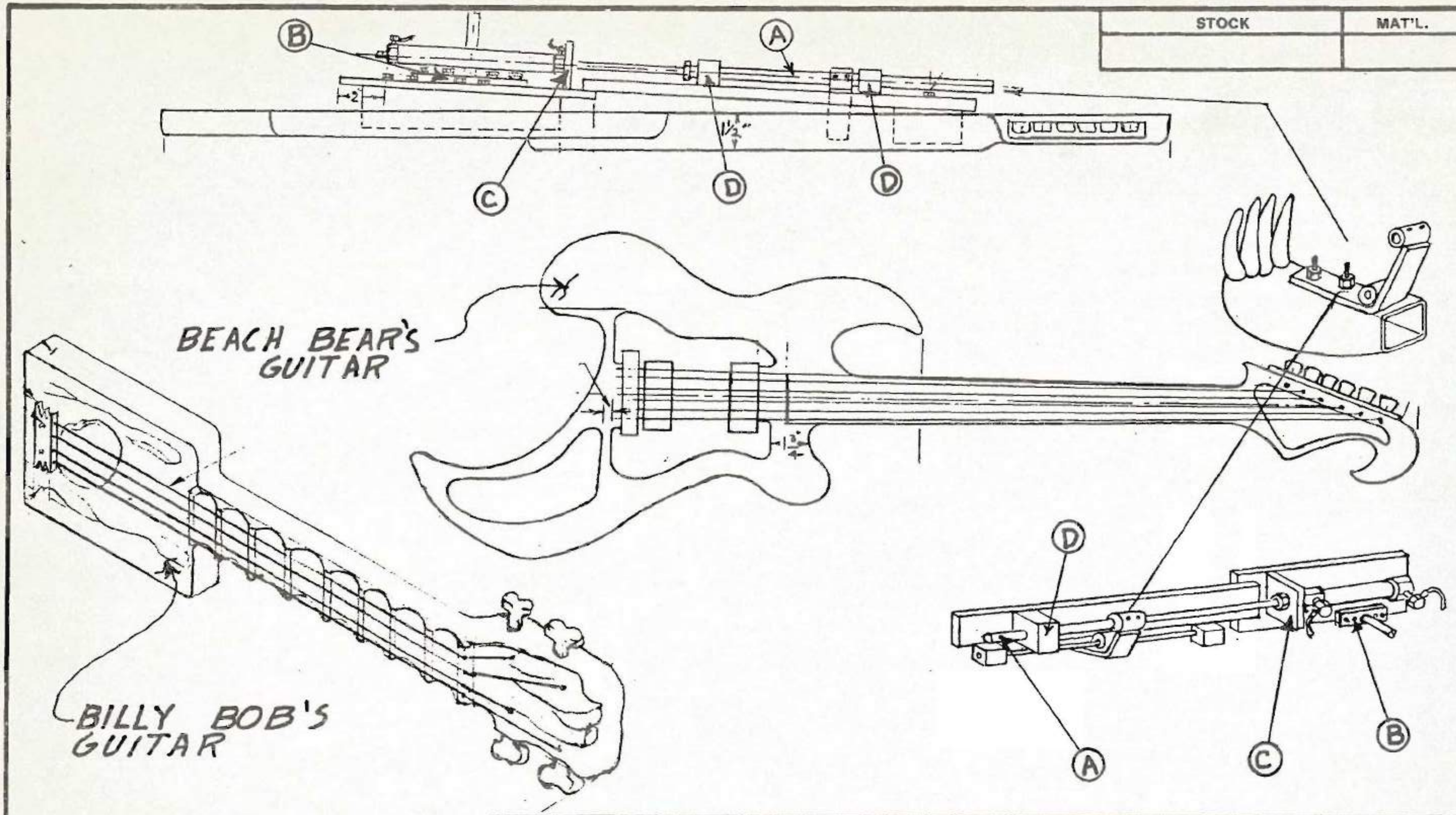
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REV. / DATE / BY	ITEM: FATZ HEAD TILT, UP		UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-056



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	ITEM: GUITAR ROCK MOVEMENT	UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:	DRAWING NUMBER 3-057

STOCK	MAT'L.



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REV. / DATE / BY			DATE: 9·23·83	CHK'D. BY
	ITEM: GUITAR MECHANISM			UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-058

The Arms and Shoulders

Description: The following text deals with the Arms and movements there in, Arm Raise, Arm Twist, Arm Swing, Elbow Twist, Elbows, and Wrist movements. There are drawings at the back of the text dealing with the movements included, use these drawings for reference only. Critical adjustments will vary with each character, so after doing any repair work refer to Pages 3-094 thru 3-135 and set the Critical Adjustments. All part numbers are available in the Parts Catalog.

A. The Arm Raise mechanisms used in the show are very simple. The rear end of a cylinder is attached to the chest using a Collar Pin and Shaft Collars. The front mount is attached to the shoulder using a Collar Pin and Shaft Collars. The only change to take place in this movement is the Collar Pin, where the length of the collar is extended to cut down on breakage.

1. If the front or rear mount pins break, note the hole on the chest where the pin is attached.

2. Remove the broken pin from the chest or shoulder, and remove the cylinder from the frame. Do not detach the cylinder from the air lines.

3. Refer to the Rock-A-fire Explosion Parts Catalog and replace the pin, tighten the pin up firmly.

4. Re-attach the cylinder to the shoulder and chest using the Shaft Collars removed in step 2.

5. Check and set the critical adjustment related to the movement.

6. Check the shoulder hinge for a smooth easy movement.(If defective refer to Pages 3-032 thru 3-041 Hinges)

B. There are 2 types of Arm Twist movements used in the show; a large shoulder and small shoulder. The difference between the two is only in the size of the parts used. All of the instructions below apply to both size shoulders. See the "Parts Catalog" for sizes and part numbers applied to the shoulder you are working on. (See Drawing Page 3-065) The arm is attached to the mount block (D) using 1/4"-20 x 1 1/2" Bolts. If the holes in the aluminum upper arm become disfigured or enlarged, assemble the upper arm box to the mount block (D) using oversized washers, tighten the bolts firmly. If the mount holes in the aluminum upper arm are damaged beyond use, replace the upper arm.

C. (See Drawing Page 3-065) Three styles of Arm Twist Actuation Levers are used in the show. The oldest style is a steel block with set screws in it. The block is drilled and pinned, using a 1/8" or 3/16" Roll Pin. The next type is a clamp on type that is also drilled and pinned with a 1/8" or 3/16" Roll Pin. The newest style is a clamp on type that need not be drilled and pinned. If work is required on the Arm Twist movement, you need to remove the shoulder assembly from the character.

1. Detach the arm raise cylinder from the front and rear mounts and unscrew the E-Hinge attached to the arm mount block that is welded to the chest.

2. Label the air lines and pull them from the Arm Twist cylinder.

3. Place the disconnected arm on a chair to hold it. Bring the shoulder assembly to the Technical Room.

D. To replace or repair any parts connected with the Arm Twist movement: (See Drawing Page 3-065)

1. To replace a broken Roll Pin, detach the Arm Twist cylinder from the actuation lever (A).
   a. Loosen the set screws in the actuation lever (A). Align the holes through the lever (A) and the Twist Shaft (B).
   b. Tap out the broken Roll Pin using a small pin and a hammer.
   c. Attempt to tap in a new Roll Pin the same size as the one removed. If the hole is over size and the pin fits in sloppy, drill the hole for the next size larger Roll Pin. Align the holes, and re-drill the hole 1/64" below the size of Roll Pin you are using. Note: If the hole must be enlarged bigger than 1/4", It is suggested to replace the Actuation Lever (A) and Twist Shaft (B).

2. If replacement of the Actuation Lever (A) is required, then replacement of the Twist Shaft (B) is probably also required. Remove the twist shaft from the assembly. Check it for scars and bad gouges, replace if necessary.

3. Check the bushings in the Twist Blocks (C), look for brass chips or powder, if they are badly worn replace them.
   a. Drill out the old bushing using either a 39/64" drill, for the 1/2" I.D. x 5/8" O.D. x 1/2" long Flange Bushing (Part #28-030-070) used in the small shoulder, or a 47/64" drill, for the 5/8" I.D. x 3/4" O.D. x 3/4" long Flange Bushing (Part #28-030-085) used in the large shoulder. Hold the drill as square as possible to the hole and drill through the bushing. You may need to break out small pieces of the bushing using a small pin or Awl.

   b. Press in the new bushing using an Arbor Press. If one is not available, place a piece of wood on top of the bushing and tap it in, using a hammer. If the hole is over size, mar the inside of the hole using a Awl. If after marring the hole, you still cannot press in the bushing, the Twist Block (C) must be replaced.

4. Replace any bad parts and re-assemble the shoulder.
   a. If new bushings were pressed in, ream them using a Hand Ream.
   b. Loosen and tighten the Twist Blocks (C) to the K-Hinge to help align the Twist Shaft (B).
   c. Grease the bushings with black (C.E.I.) lube before assembly.

5. Set the critical adjustment of the arm mount block (D), and re-attach the shoulder to the character, using all the hardware previously removed.

6. Check all critical adjustments applied to the removed arm, The arm twist may need adjusting after reassembly, if time allows refer to Pages 1-010 thru 1-014, Video Testing Procedures.

E. The Arm Swing movement is only used by Fatz and Dook, the movement is simple and has few recorded problems. In the Arm Swing movement the rear end of a cylinder is attached to the welded leg frame, via a Collar Pin. The front mount is attached to the arm swing hinge, via a welded mount block.

   1. If the weld breaks at the front mount block, replacement of the upper arm is required.

   2. If the rear cylinder mount Collar Pin breaks, replace it.

   3. For any problems in the cylinder, see Pages 3-009 thru 3-011, and all drawings referred to by that text.

F. The Elbow Twist Movement (See Drawing Page 3-066) is basically the same as the Arm Twist movement. A cylinder moves an actuation lever which turns a twist rod attached to the lower arm. For any problems in the Elbow Twist follow the same steps as in the Arm Twist. (Steps B,C and D) The biggest difference between the 2 types of Twist Movement, is that the shoulder is hinged to bend and to twist, but the elbow is only designed to twist. So where a Elbow Twist movement is used a Elbow Bend movement is not.

G. The Elbow Bend movement used for Fatz and Dook is different than the Elbow bend, for Rolfe's left arm and both of Mitzi's arms. (See Drawing Page 3-067)

H. Fatz's and Dook's Elbow Bend movement; (See Drawing Page 3-067) if after trouble shooting you have found a problem being either loose mounts or broken parts:

1. For any problems in the cylinder, including the rear mount bushing, refer to Pages 3-009 thru 3-011, and all drawings referred to by that text.

2. If the pivot bushings (A) wear out and need replacement:
   a. Disassemble the Elbow cylinders front mount from the lower arm. Remember to note the assembly prior to disassembly.

   b. Remove the Shaft Collar (B) from the lower arm mount Collar Pin. Remove the lower arm from the character and bring the arm to the Technical Room.

   c. The bushing used in Fatz's and Dook's lower arm is a 1/2" I.D. x 5/8" O.D. x 1/2" long Flange Bushing. (Part #28-030-070) Put the lower arm in a vise and drill out the worn bushings, using a 39/64" Drill. Hold the drill as straight as possible to the hole.

   d. Press in the new bushings using an Arbor Press. If one is not available place a piece of wood on the bearing to protect it and tap in the new bushings using a hammer, Hand Ream the bushing.

   e. Re-assemble the lower arm onto the character, using the same hardware previously removed, and set the critical adjustments.

3. If either arm mount Collar Pin or the cylinder rear mount collar pins breaks, replacement is required. Most of the time when the rear mount pin breaks, it is due to the bushing in the arm or cylinder wearing out. Check them and replace if necessary. (See Step 3-b, Page 3-061)
   a. Remove the old broken collar pin, and any reusable hardware from the assembly.
   b. See Parts Catalog and get a replacement pin. Attach the new pin into its mount, tighten firmly.
   c. Re-assemble the mechanism using the hardware previously removed then set the critical adjustments.

I. Mitzi's and Rolfe's elbow bend movement: (See Drawing Page 3-067)
   1. For any broken welds, replacement of the upper or lower arm is required. It is not suggested to have a part welded in the field.
   2. For any problems in the cylinder, refer to Pages 3-009 thru 3-011, and all drawings referred to by that text.
   3. For problems in the F.U.M. to Stud elbow hinge, refer to Pages 3-032 thru 3-041, Hinges.
   4. If the bushing in the welded front cylinder mount is in need of replacement:
      a. Detach the cylinder from the arm at the front mount.
      b. Disassemble the elbow hinge, save all hardware removed.
      c. Press out or tap out the defective bushing, and get a replacement.
      d. Attempt to press in the new bushing. If the hole is sloppy, mar it using an Awl. If a good press is not possible, replacement of the lower arm is required.
   5. Re-assemble the arm using the same hardware previously removed and set the critical adjustment.

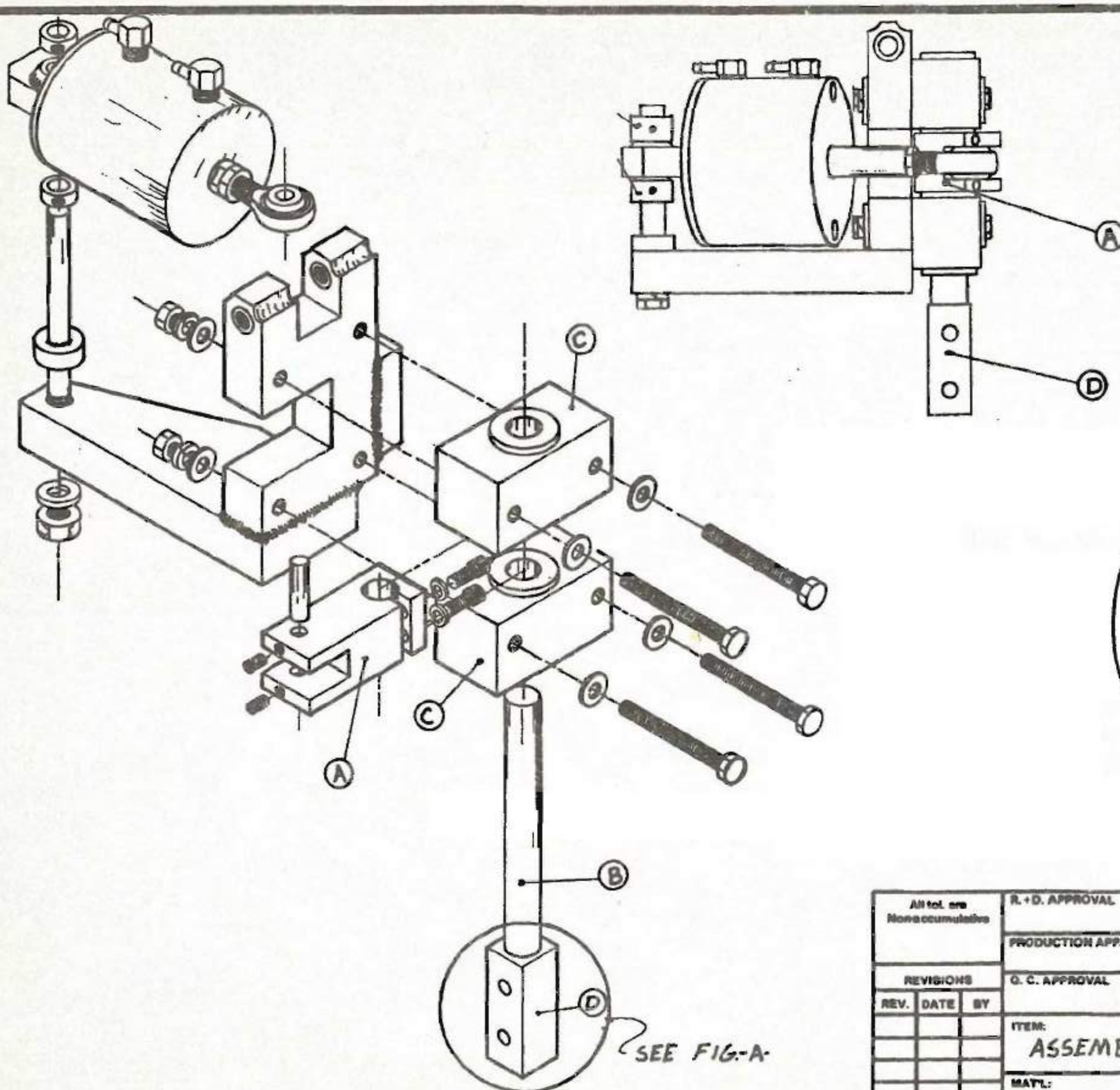
J. Rolfe's (Earl Head Tilt), Billy Bob's and Beach Bear's wrist movements are basically the same. (See Drawing Page 3-068)
   1. For any problems in the wrist hinge, see Pages 3-032 thru 3-041, Hinges.

   2. For any problems in the cylinder, see Pages 3-009 thru 3-011, and all drawings referred to by that text.

   3. For any broken welds or broken aluminum parts replacement of the parts are required.

   4. After repair or replacement of any part, set the critical adjustments.

K. The cylinder mount blocks welded to the arms have set screws in them to hold the mount pin into place. If the set screw holes strip out and will not hold, re-drill them to the larger size. If re-drilling the set screws is impossible, don't worry about it. But when the mount pin hole enlarges replace the part of the arm in question. Note your step and set critical adjustments. Refer to the movement in the question for replacement instructions.



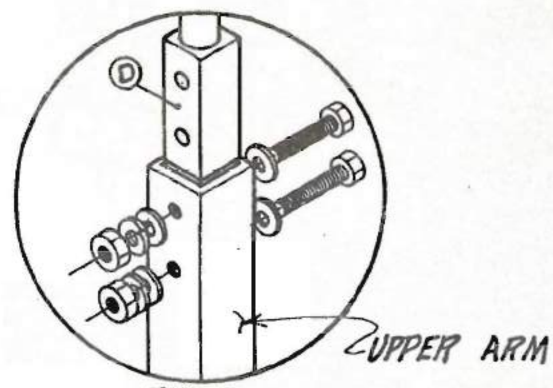
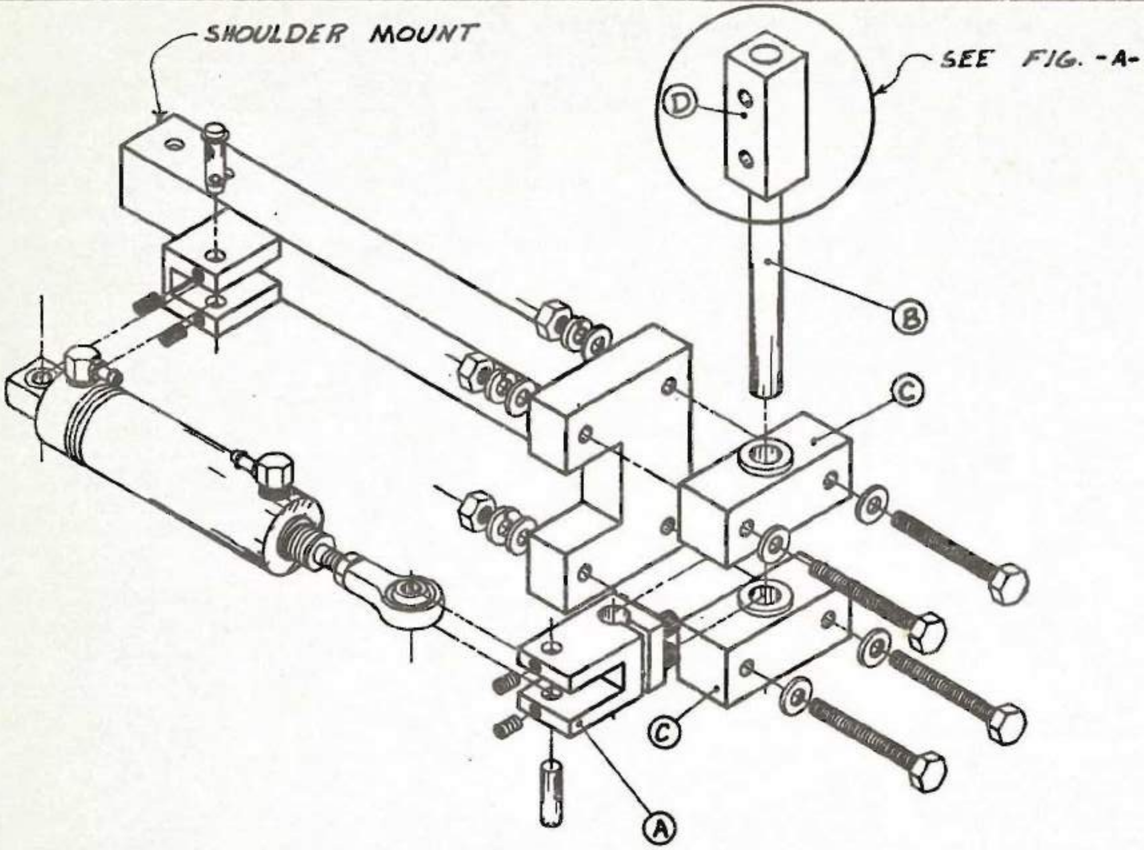


FIG. A

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	ITEM: ASSEMBLY ARM TWIST	DATE: 9·15·83	CHK'D. BY
			UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-065



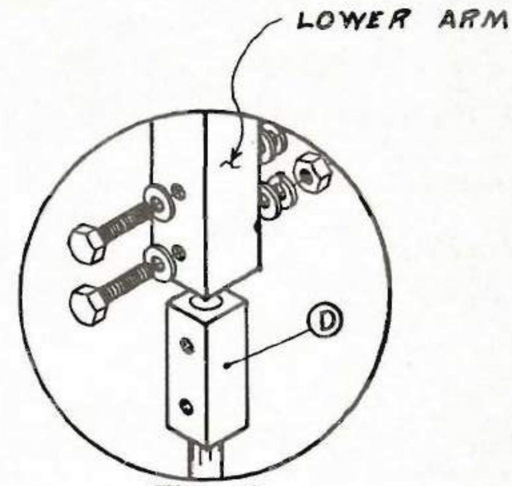
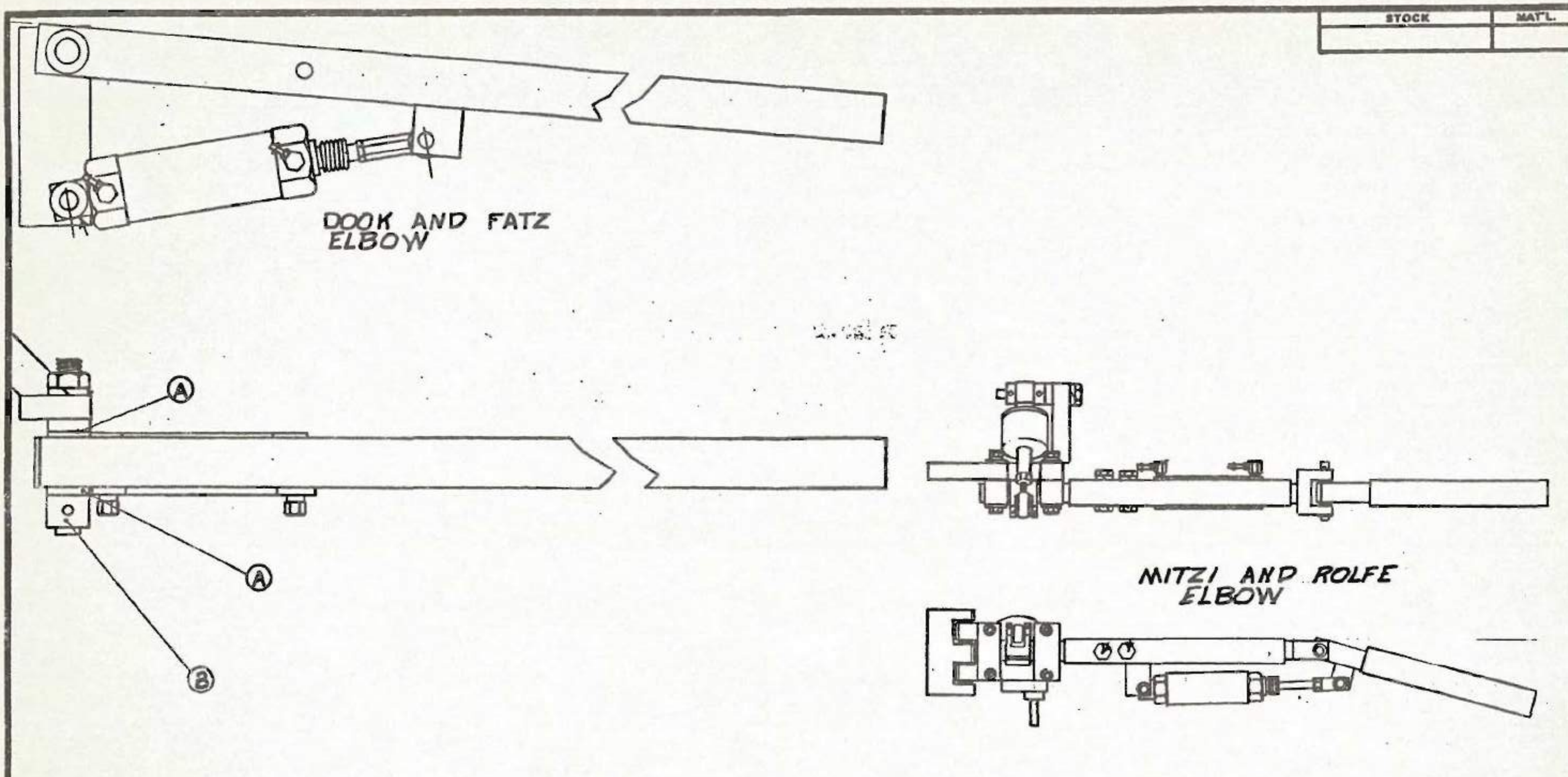


FIG. -A-

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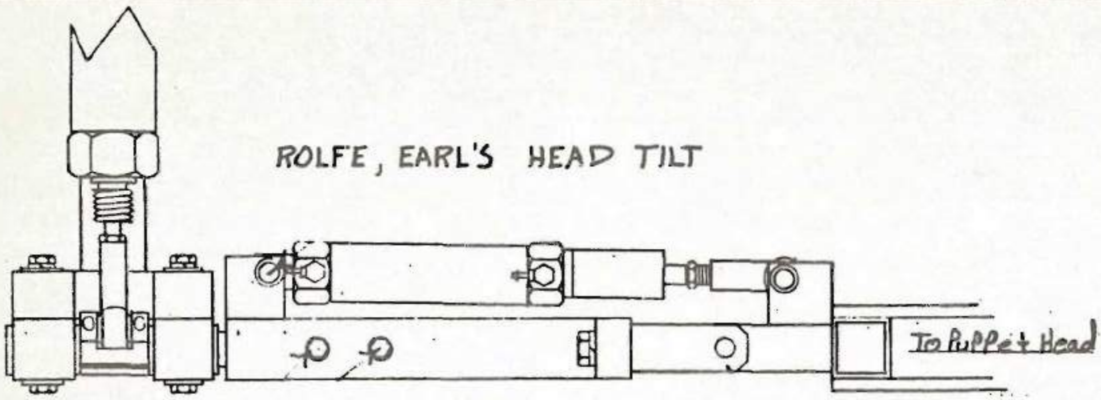
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			ITEM: LOWER ARM TWIST				UNTOLERANCED DIM. FRACT'L. ±.020 DECIMAL .xx ± .010 .xxx ± .005
			MAT'L:				DRAWING NUMBER 3-066



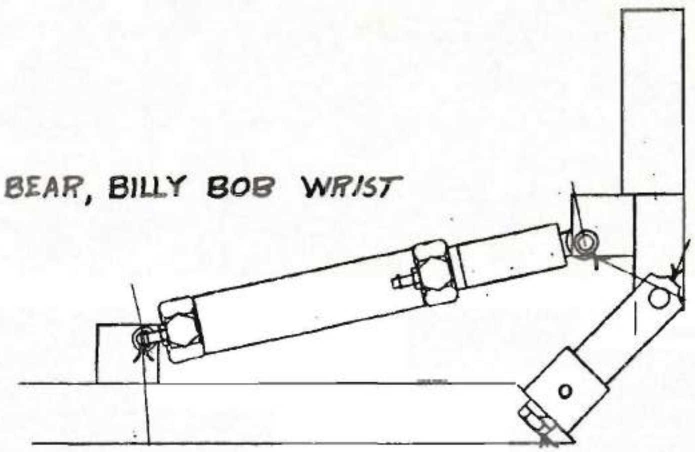
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REV. / DATE / BY					CHK'D. BY
	ITEM: ELBOW MOVEMENT				UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:				DRAWING NUMBER 3-067

ROLFE, EARL'S HEAD TILT



BEACH BEAR, BILLY BOB WRIST



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REV. DATE BY			DATE: 9·19·83	CHK'D. BY
	ITEM: WRIST MOVEMENT			UNTOLERANCED DIM. FRACT'L. ±.020 DECIMAL .XX ± .010 .XXX ± .005
	MAT'L:			DRAWING NUMBER 3-068

The Legs and Pelvis

Description: The following text deals with the legs and hip movements, Body Lean, Body Turn, Foot Tap, Leg Kick and Spring Plate assembly. There are drawings in the back of the text depicting the movements. Use these drawings for reference only. Critical adjustments on each character may vary with each character, so after any repair work refer to Pages 3-094 thru 3-135 and set the Critical Adjustments.

A. There are two types of Body Lean movements used in the show. One is the non-body twisting type used by Dook, Beach Bear and Fatz, in this type the Body Lean's cylinder rear mount is welded to the leg frame. Two is the body twisting type used by Billy Bob, Mitzi and Rolfe. In this type a "clamp on" Body Lean cylinder rear mount is used. The Body Lean's front cylinder mount is typical to all the characters.

1. The non-body twisting type of Body Lean movement is simple and has few problems. The front and rear mounts of the Body Lean cylinder are attached using Fas-Pins. For any broken welds in the front replace the part. If the weld breaks at the rear mount replacement of the leg frame is required, numbers are available in the Parts Catalog. If you have a problem in the pelvis hinge, refer to Pages 3-032 thru 3-041, Hinges. For any problems in the Body Lean cylinder, refer to Pages 3-009 thru 3-011, and all drawings referred to by that text. The rear cylinder mount Fas-Pin is held into the rear mount block using set screws. The set screws must be kept tight, if they are not, the Fas-Pin will move back and forth inside the hole and the hole will elongate. If this happens, replacement of the leg frame is required. If the set screws holes become enlarged or the threads pull out, drill and tap the holes to the next larger size of set screw (5/16"-18 Tap).

    a. Remove the rear mount of the cylinder from the block, support the body by placing two pieces of metal and a clamp at the pelvis hinge.

    b. Drill out the holes using a 1/4" drill.

    c. Tap the holes using a 5/16"-18 Tap.

    d. Re-attach the cylinder's rear mount and the new set screws, set the critical adjustment.

2. To replace a welded leg frame:

   a. Remove any parts not welded to the legs and save them. Disassemble as few mechanisms as possible, and keep notes on the steps followed.

   b. Cut the cable ties holding the plumbing harness to the legs.

   c. Pulling the air lines from any cylinder should not be required, if it is, remember to note the air lines.

   d. Unbolt the legs from the platform, and bolt on the new ones in the same place as the old ones. If the mount holes in the platform are over size, re-attach the new leg frames to the platform, moving them as little as possible from the old character's placement.

   e. Re-attach all the parts, and set all critical adjustments. If any problems occur refer to the individual movement in the text for a more detailed explanation.

3. The Clamp on type Rear Mount is similar to the welded one, and all the instructions described above apply, except one. If the pin hole is enlarged or elongated you can replace only the rear mount, and not the whole leg frame. To replace the rear mount: (See Drawing Page 3-073)

   a. Detach the Body Turn cylinder's front and rear mount from the Collar Pins, using an Allen wrench.

   b. Cut the cable ties holding the plumbing harness to the leg, be careful you don't cut any air lines.

   c. The older shows have a piece of plastic pipe (A) between the upper pillow block and the steel pelvis mount plate (B). Loosen the set screws in the pillow blocks (C) and the steel rear mount.

   d. The newer shows do not have the plastic pipe (A) for added support of the upper character. So, only loosen the two pillow blocks, then, when your ready to lift the chest, loosen the rear mount. Remove and replace the rear mount in one step.

   e. Replace the bad rear mount. Re-attach the parts and set all critical adjustments.

4. The body lean front mount (D) is bolted to the chest, and has a cylindrical bushing pressed into it. The bushing used in the mount is a 3/8"I.D. x 1/2"O.D. x 1/2" long. (Part #28-032-020) The bushing may become sloppy due to wear and tear. If the bushing is allowed to wear to a point where the hole it's pressed into is elongated and the bushing falls out, replacement of the front mount is required. To replace The bushing:

   a. Detach the cylinder from the front mount, support the body by placing two pieces of metal and a clamp at the pelvis hinge (E).

   b. Unbolt the front mount from the chest. Fatz front mount bolts also hold the rear Fiberglass Body part onto the character so removal of it is necessary.

   c. Using an Arbor press and a 7/16" steel pin, press out the old bushing. If an Arbor press is not available use a hammer and steel pin.

   d. Press in the new bushing. Hand ream it and make sure it will attach easily to the Body Lean cylinder. File the sides of the bushing if it won't fit on the cylinder's front mount clevis.

   e. Re-attach the front mount to the chest and cylinder, set the critical adjustments.

B. The Body Turn movement (See Drawing Page 3-073) is a 4 way movement. This is accomplished by attaching two cylinders back to back. For any problems in the cylinder refer to Pages 3-009 thru 3-011, and all drawings referred to by that text. The two mounts to the cylinder are both collar pins (F), replace them if they break, (Numbers are in the Parts Catalog) then, set the critical adjustments.

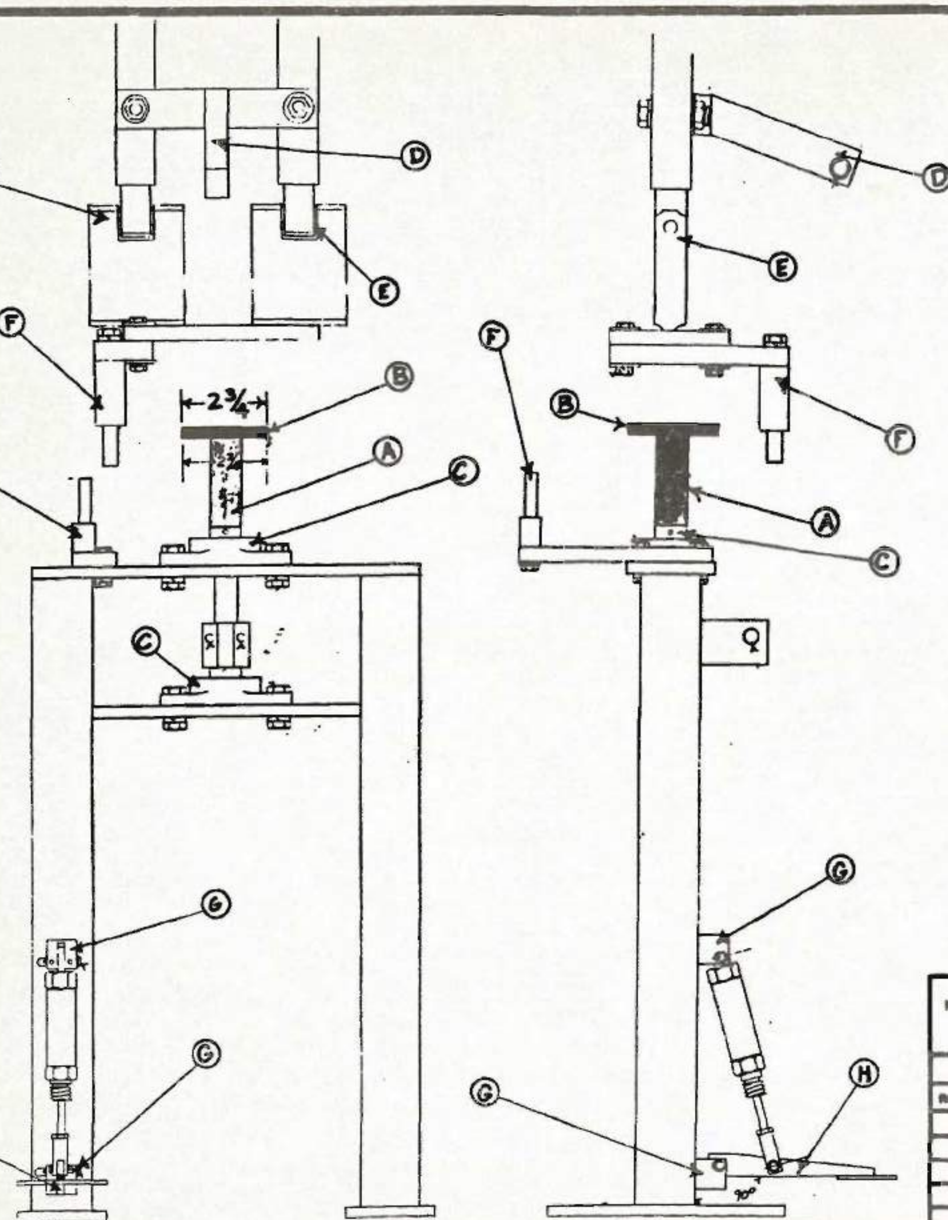
   1. If the weld attaching the steel pelvis mount plate (B) to the twist shaft breaks, replacement of the welded part is required. If this happens the body turn movement is under a lot of stress. Check over and rebuild the cylinders if necessary, see Pages 3-009 thru 3-011, and all drawings referred to by that text.

2. If the pillow blocks (C) wear out or break, or if any parts need replacement in the Body Turn Movement:
   a. Cut the cable ties attaching the plumbing harness to the leg.
   b. Detach the Body Lean cylinder from the character. Do not pull the air lines, unless you must.
   c. Place the upper body on the floor, be careful you don't cut or pinch any air lines. Note the height of the Pelvis Plate off the legs.
   d. Detach the twist shaft from the pillow blocks (C) and remove the pelvis mount plate (B) from the pelvis.
   e. Attach the new shaft and plate into the legs. Adjust the height of the plate to the same dimension as before you removed it, and tighten the set screws and rear mount block.
   f. Re-attach the pelvis plate and upper body. Attach the Body Lean cylinder and Body Turn cylinders. Set all critical adjustments.

C. The Foot Tap movement (See Drawing Page 3-073) is attached together using three Fas-Pins. It has two parts; a cylinder and a lever. For any problems in the cylinder refer to Pages 3-009 thru 3-011, and all drawings referred to by that text.
   1. Keep the set screws in the blocks (G) tight. Drill and re-tap the set screws holes bigger if necessary.
   2. If the bushings in the lever (H) need replacing:
      a. Pull the Fas-Pins and remove the lever from the leg.
      b. Press out the old bushing and press back in the new.
      c. Re-assemble the mechanism and set the critical adjustment.

D. The Leg Kick movement is used only by Beach Bear. (See Drawing 3-074) For any problems in the cylinder see Pages 3-009 thru 3-011, and all drawings referred to by that text. For any problems in the hinge see Pages 3-032 thru 3-041.
   1. If any welded mounts break, replacement of the leg or leg frame is required.
   2. To replace a worn bushing, disassemble the knee hinge, press out the worn bushing and press in the new. Re-assemble the parts and set all critical adjustments.

E. The Spring plate assembly is simple rubber motor mounts that are bolted between mount plates. Dook and Beach Bear use the Spring Plate assembly. If a motor mount breaks, replace it. If the fiberglass surf board breaks from its mount holes, re-assemble with oversize washers.



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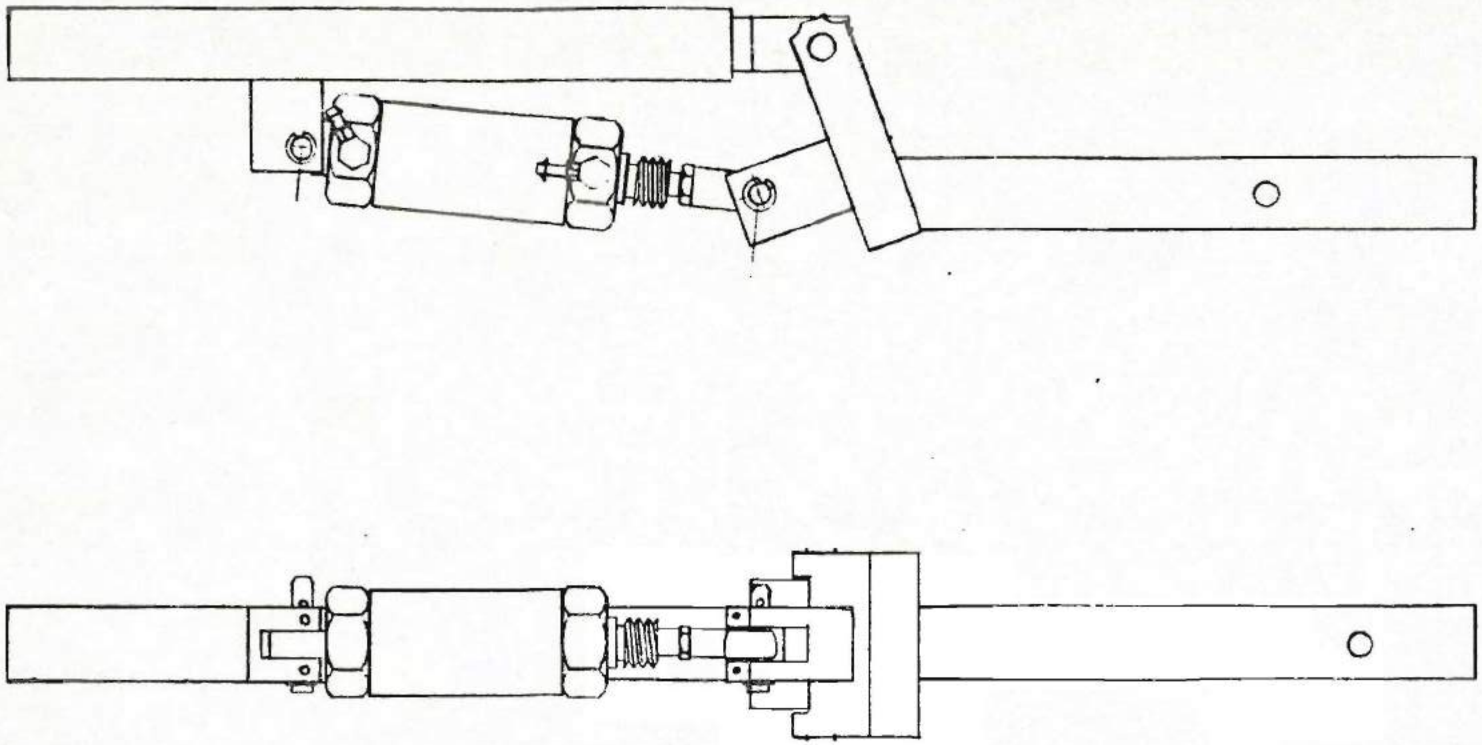
UNTOLERANCED DIM.
FRACT'L. ± .020
DECIMAL .xx ± .010 .xxx ± .005

ITEM: LEG MOVEMENTS

MAT'L:

DRAWING NUMBER 3-073

STOCK	MAT'L.



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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY ED
REV. / DATE / BY			DATE: 10·21·83	CHK'D. BY
	ITEM: BEACH BEAR LEG KICK			UNTOLERANCED DIM. FRACT'L. ± 020; DECIMAL .xx ± .010, .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-07

Props and Looney Bird

Description: The following text deals with the Props, Sun, Moon, Spider, Baby Bear and Dook's Base Drum and High Hat. Also included in the text is Looney Bird which is classified as a character. Looney Bird is included with the props because the mechanism is like the Sun and Moon. The drawings included are for reference only, critical adjustments are not to be taken from them. (See Critical Adjustments Pages 3-094 thru 3-135) All part numbers are available in the Parts Catalog.

A. Looney Bird's head is typical to the rest of the characters. (See Pages 3-042 thru 3-046 "The Head" for any problems)

B. The Sun Mouth Mechanism: (See Drawing Page 3-083) The Mouth mechanism is attached together using 3 Fas-Pins. It consists of 3 major parts; the Sun Face mount box and mouth pivot (A), mouth lever and the cylinder. For any problems in the cylinder refer to, Pages 3-009 thru 3-011, and all drawings referred to by that text.

   1. Keep the set screws in the cylinders rear mount block, and the set screws in the pivot block tight. Drill out and Re-Tap the set screw holes to the next larger size thread if necessary. If Re-Tapping the set screw holes is impossible, the Fas-Pin will eventually wear the mount holes oversized, and the movement will get sloppy. If the mount holes becomes oversized, replacement of the mount box is required.

   2. If the bushings in the Mouth Lever (B) need replacing:
      a. Detach the Mouth Lever (B) from the latex mask, and save all the parts.
      b. Pull the Fas-Pins out of the cylinder and pivot block (A).
      c. Press out the worn bushing and press back in the new.
      d. Re-assemble the mechanism. Re-attach the Mouth Lever to the latex mask (Don't forget the Mouth Support Plate (C). Set the Critical Adjustments.

   3. If the Latex Sun Face tears, refer to Pages 3-136 thru 3-187 Cosmetics, for repair or replacement.

C. The Moon Mouth Mechanism: (See Drawing Page 3-084) The mouth mechanism used by the Moon is more like a Elbow Hinge than mouth mechanism. The mechanism is made up by 3 major parts, The Upper Mouth, Lower Mouth and Cylinder. The hinge joining the Upper, to the Lower Mouth is a F.U.M. Hinge to Stud, for any problems, refer to Pages 3-032 thru 3-041 "Hinges". For any problems in the cylinder refer to Pages 3-009 thru 3-011, and all drawings referred to by that text. If the Foam Body or Latex rips, refer to Pages 3-136 thru 3-187 Cosmetics.

1. (See Drawing Page 3-084) There are set screws in the cylinder's rear mount block (A), keep them tight. If the set screws loosen, the rear mount Fas-Pin will move inside the hole and enlarge or elongate the rear mount hole. If the set screws won't hold inside the hole, drill and re-tap the screw hole to the next larger size. If the rear mount hole is enlarged the movement will be sloppy, replacement of the Upper Moon Mouth is required.

2. To replace the bushing in the Lower Mouth's cylinder front mount (B):
   a. Tap out the old oversize bushing using a steel pin and a hammer. Don't disassemble the hinge unless you must.
   b. Tap in a new bushing, place a piece of wood on top of the bushing to protect it. If you cannot get a good press, mar the hole with an Awl. If marring the hole doesn't work, replace the Lower Mouth.
   c. Re-assemble the mechanism and check Critical Adjustments.

3. The Moon's upper neck shaft (C) is made of aluminum and is welded to the Upper Mouth Piece. If the end of the Moon's face catches on the prop in front of it, the Upper neck shaft will bend. If the Upper Neck Shaft breaks at the weld, replacement of the Upper mouth piece is required. Move the prop to allow plenty of clearance.
   a. Label and pull the air lines away from the mouth cylinder.
   b. Remove the Upper Neck shaft and mouth assembly from the spring neck shaft.
   c. Place the rod in a vise at the bend and close the vise to straighten it out. Place a rag over the shaft to protect it from being marred.
   d. Re-attach the neck to the spring neck piece. Re-attach the air lines to the mouth cylinder, and set the Critical Adjustments.

D. The Spring Neck Assembly used by Looney Bird and the Moon: (See Drawing Page 3-085) The main problem to occur in the Spring Neck, is the Universal Joint breaks. If it breaks:

   1. Remove the Head and Upper Neck, and the Spring assembly from the character. The neck attaches to the Spring neck using two piece collars, loosen them to remove it.

   2. Pull the retaining clips and disassemble the neck. Replace all broken parts.

   3. Re-assemble the neck, don't forget to grease the Universal Joint, using black (C.E.I.) lube.

   4. Re-assemble the character and set all Critical Adjustments.

E. The Carrier Mechanism (See Drawings Pages 3-086 and 3-087) used by Looney Bird, the Moon and Sun are basically the same.

1. The only difference between the two, is that the carrier for the Bird has 5/8" Pillow Blocks for the Head Turn mechanism, and is larger.

2. One problem with the carrier is that the 1/2" Super 8 Pillow Blocks wear out, and looses ball bearings. To replace a 1/2" Pillow Block:
   a. Loosen the 1/2" Pillow block in question from the carrier. Remove the screws and place them to the side for reassembly.
   b. Remove the shaft cap (A), and place it to the side.
   c. Get the replacement pillow block.
   d. Loosen the 1/2" jam nut (B) on the shaft, and unscrew the shaft from the block (C).
   e. Lift the shaft, and remove and replace the 1/2" Pillow block in one step.
   f. Re-attach the pillow block to the carrier, actuate the movement and check for a smooth movement on the shaft.

3. If the set screws in the neck mount blocks (D) will not hold up the head, you can place a 5/8" Shaft Collar on top of the upper block (D) for added support. If the set screw holes are oversized, drill and re-tap them to the next larger size tap. If re-taping the holes is impossible, replace the carrier frame.

4. If the welded carrier to cylinder mount (E) breaks, replace it. To replace the Bird's carrier to cylinder mount, you will first have to remove the head and neck shaft.

5. For any problems in the Tol-O-Matic cylinder, refer to Pages 3-009 and 3-011, and all drawings referred to by that text.

F. Looney Bird's Head Turn Mechanism: (See Drawing Page 3-088) The Head Turn mechanism is simple and should have few problems. The front mount of the Head Turn mechanism (Actuation Lever), has used two types of lever. One; is a steel plate welded to a shaft collar, that is drilled and pinned to the neck shaft. In the case of the steel plate, the Head Turn cylinder attaches using a Clevis and Fas-Pin. Two; The newer block, is a machined Steel block that clamps on to the neck shaft. In the case of the machined steel block the cylinder attaches using a Rod End and Aircraft Bolt.

1. If the Roll Pin attaching the Actuation Lever to the neck shaft breaks:
   a. Align the holes and tap out the broken Roll Pin, using a steel pin and Hammer.

   b. Tap in a new roll pin, the same size as the one you removed.

   c. If the same size Roll Pin won't fit because the hole is oversized, Drill out the hole 1/64" under the size of the next larger Roll Pin. Tap in the new larger Roll Pin and set the Critical Adjustments.

2. If repairing the Roll Pin is impossible, replacement of the Actuation lever is required. Also, if the lever must be replaced then the Lower Neck Shaft probably needs replacement.
   a. Tap out the Roll Pin, loosen the set screws in the Pillow Blocks and Actuation Lever.

   b. Remove the 2 piece Clamping Collar, and remove the head and upper neck shafts.

   c. Re-assemble the mechanism using the new neck shaft and Actuation Lever. Tighten the Pillow Blocks to the shaft and re-attach the head and upper neck assembly. Do not tighten the new Actuation Lever on the neck shaft, it needs to be loose in order to set the Critical Adjustments.

   d. Replace the cylinders front mount Clevis, for a 3/8" Rod End. Do not tighten down the Jam Nut.

   e. Re-attach the cylinder to the Actuation Lever, using a 3/8" x 15/16" Aircraft Bolt, #/8" Self Locking Nut and a 3/8" Washer. (See Drawing Page 3-088)

3. If the rear mount Collar Pin for the head turn cylinder breaks, replacement is required.

4. After any repair work, refer to Pages 3-094 thru 3-135, Critical Adjustments.

G. The Looney Bird Hands (See Drawing Page 3-089) mechanism is simple and should have few problems, other than normal wear and tear.

1. For any problems in the cylinder, refer to pages 3-009 thru 3-011, and all drawings referred to by that text. All part numbers are available in the Parts Catalog. After any repair work refer to Pages 3-094 thru 3-135 and set the critical adjustments. For any problems in the fur hands, refer to Pages 3-136 thru 3-187, Cosmetics.

2. The Actuation Block and Plate (C) are joined using a steel pin, that is pressed into place at the factory. If the bushings in the Actuation Block (C) need replacing:

   a. Detach the cylinders front mount from the Plate (C). (Note the location of the washers (L) in the assembly)

   b. Detach the Actuation Block (C) from the carrier (A), by unscrewing the two screws (D).

   c. Using a Arbor press and a steel pin, press out the steel pin. If an Arbor press is not available use a hammer and a steel pin. Press out the old bushings, and press in the new, if a tight press is not available mar the hole using an Awl, if that does not work replace the Actuation Block and Plate. (The bushings used in the block are 1/4" I.D. x 3/8" O.D. x 1/4" long Part # 28-032-210) Press the 1/4" steel pin back through the block and plate.

   d. Re-assemble the mechanism, double check your work, and set all critical adjustments.

3. If the lower mount support pieces, for the plastic block (F) and plastic page (I) should move, the plastic block (F) could be damaged beyond use. To replace it simply remove the rear mount pieces, and allow the block (F) to come off the Guide Shaft (E). Replace the block and reattach the old plastic page (I).

4. The plastic page could break if mishandled, to replace it simply unscrew the page from the block and replace with the new one.

H. The assembly of the Spider's Pulley Plate is done in two different ways. (See Drawings Pages 3-090 and 3-091) One, is the amended old pulley plate. Two, is the new mechanisms from the factory.

1. Watch the plastic bushings (A), if they come out of the hole the line will wear through from rubbing on the metal Guide (B). To replace the lines:
   a. Shut off the air to the Props Valve Bank. Pull the Spider into the down position, and note the height of the Spider off the floor.

   b. Cut the lines, near the cable crimps (C), at the Spider and cylinder. Be careful you don't cut the Cable Thimbles (D). Do not remove the 3/8" bolt (E), attaching the Thimble (D) to the cylinder's carrier.

   c. Fold the 25' line in half, and attach the Cable Thimble (D) and Crimp at the center of the line.

   d. Route to ends of the new line through the Cable Guide (B). Re-attach the Spider to the lines at the noted height off the floor.

2. If the bushings in the Pulleys (E) need replacing:
   a. Loosen the set screws in the pulley mount plates (F), or remove the bolt. Tap out the Pivot Pin (G) and remove the parts.

   b. The bushing pressed into the Pulleys is a 5/16"I.D. x 3/8"O.D. x 3/8" long Flange Bushing. (Part #28-030-040) Place the Pulley in a vise (wrap it with a rag to protect it) and drill out the old worn bushing using a 23/64" drill. You may need to press out pieces of the bushing, use a small pin or Awl.

   c. Press in the new bushing using an Arbor Press, if one is not available tap it in using a hammer. If a tight press is not possible, replacement of the part is required.

   d. Re-assemble the parts and double check the alignment of the Pulley Guides (B). Grease the Pivot Pin with black (C.E.I.) lube. The pulleys should roll freely, hand ream the bushings if necessary.

3. For any problems in the Spiders Tol-O-Matic cylinder, refer to Pages 3-009 and 3-011. If replacement of any parts is required, remember to note the steps you take.

I. The Baby Bear or Cub Mechanism:

1. (See Drawing Page 3-092) For any problems in the cylinder, refer to Pages 3-009 thru 3-011, and all drawings referred to by that text. To remove the cylinder, pull out the Fas-Pin rear mount (A), and unbolt the front mount. When replacing the cylinder, tighten the front mount bolt (B) firmly.

2. (See Drawing Page 3-092) There are two 3/8" Pillow Blocks (C) used in the assembly. They may wear out and lose ball bearings, if they are not greased properly in P.M. To replace a bad Pillow Block (C):
   a. Loosen the jam nut (D) and remove the locking nut (E) on the guide shaft. Remove the guide shaft from the assembly.
   b. Loosen the screws holding the Pillow Block (C) into place.
   c. Remove the bad Pillow Block and attach the new Pillow Block, in one step. Do not tighten the Pillow Block into place. This allows you to make the repair without removing the mechanism from the platform.
   d. Place the guide shaft back into the assembly. Tighten the Pillow Block and guide shaft into place. Actuate the movement and check for a smooth and easy function.

3. (See Drawing Page 3-092) There are two springs used in the Cub mechanism. If the spring (F) breaks replace it, simply remove the old and place back in the new. If the spring (G) or the Universal Joint (H) breaks:
   a. Loosen the two 2 Piece Locking Collars (I) and remove the broken part or parts.
   b. Reassemble the mechanism using the new parts, and tighten the Locking Collars (I).
   c. Refer to Pages 3-094 thru 3-135 and check the Critical Adjustments.

4. If removal of the mechanism from the platform is required, place it back in the platform in the same placement as before, or as close as possible.

J. The High Hat and Base Drum mechanism: (See Drawing Page 3-093)

1. For any problems in the cylinder refer to Pages 3-009 thru 3-011, and all drawings referred to by that text. If replacement of a cylinder is required refer to the Parts Catalog for part numbers.

2. There are four set screws used to hold the rear mount pin (A) into place, keep them tight. Also keep the Shaft Collars (B) tight against the cylinder. If the Shaft Collars are not kept tight the cylinder will mis-align, and rebuilding it will be necessary. If the set screw holes are striped, you can drill and re-tap the holes to the next larger size tap.
   a. Detach the cylinders front mount from the block attached to the Foot Pedal.

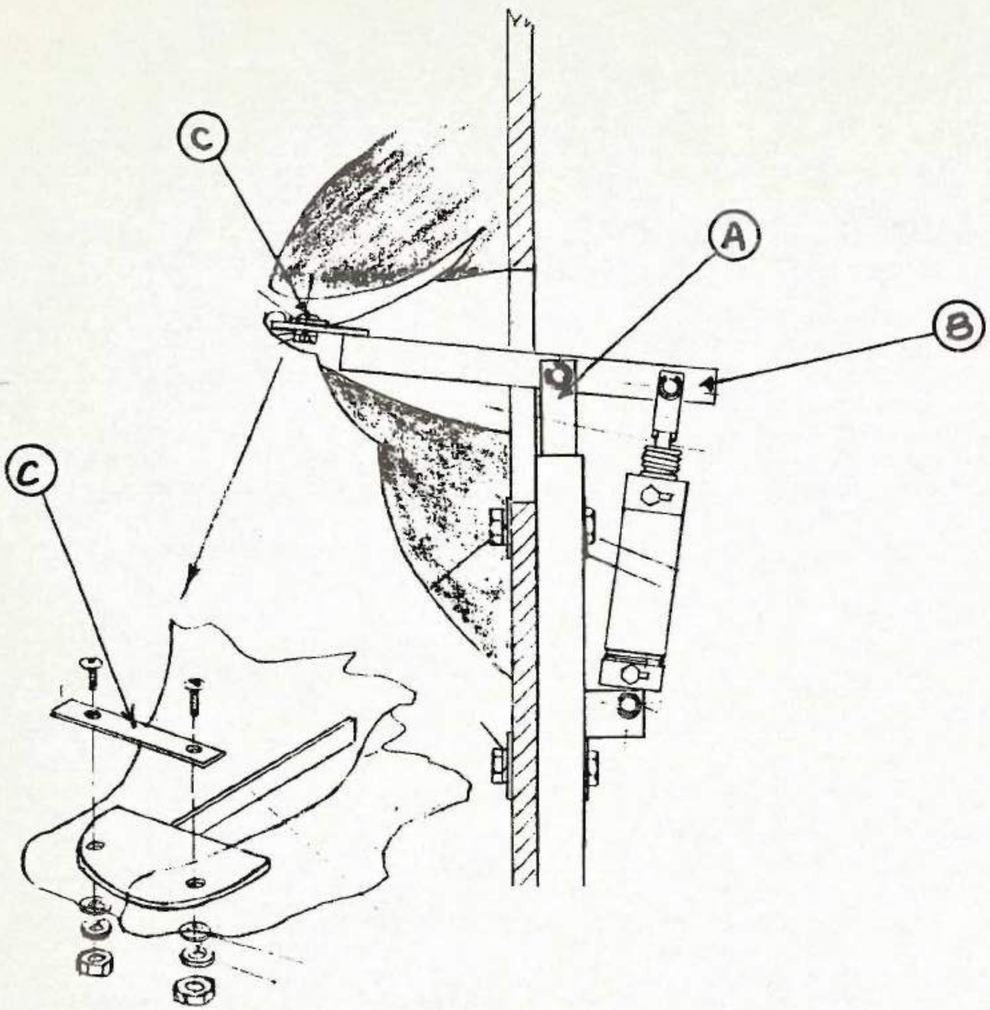
   b. Unscrew the four bolts (C) holding the frame to the welded mount pieces (D).

   c. The original set screws used in the assembly are 8-32 x 1/4" or 3/8" long. So drill out the hole or holes for a 10-32 screw. Run the Tap and re-assemble the mechanism. Set the critical adjustments.

3. The front mount of the cylinder, is attached to a welded mount block (E). The cylinder is attached using a Fas-Pin and set screws. The welded Mount Block (E) is then bolted to the Foot Pedal.
   a. If the weld breaks, replace the part. Simply detach the cylinder and the Pedal from the front mount.

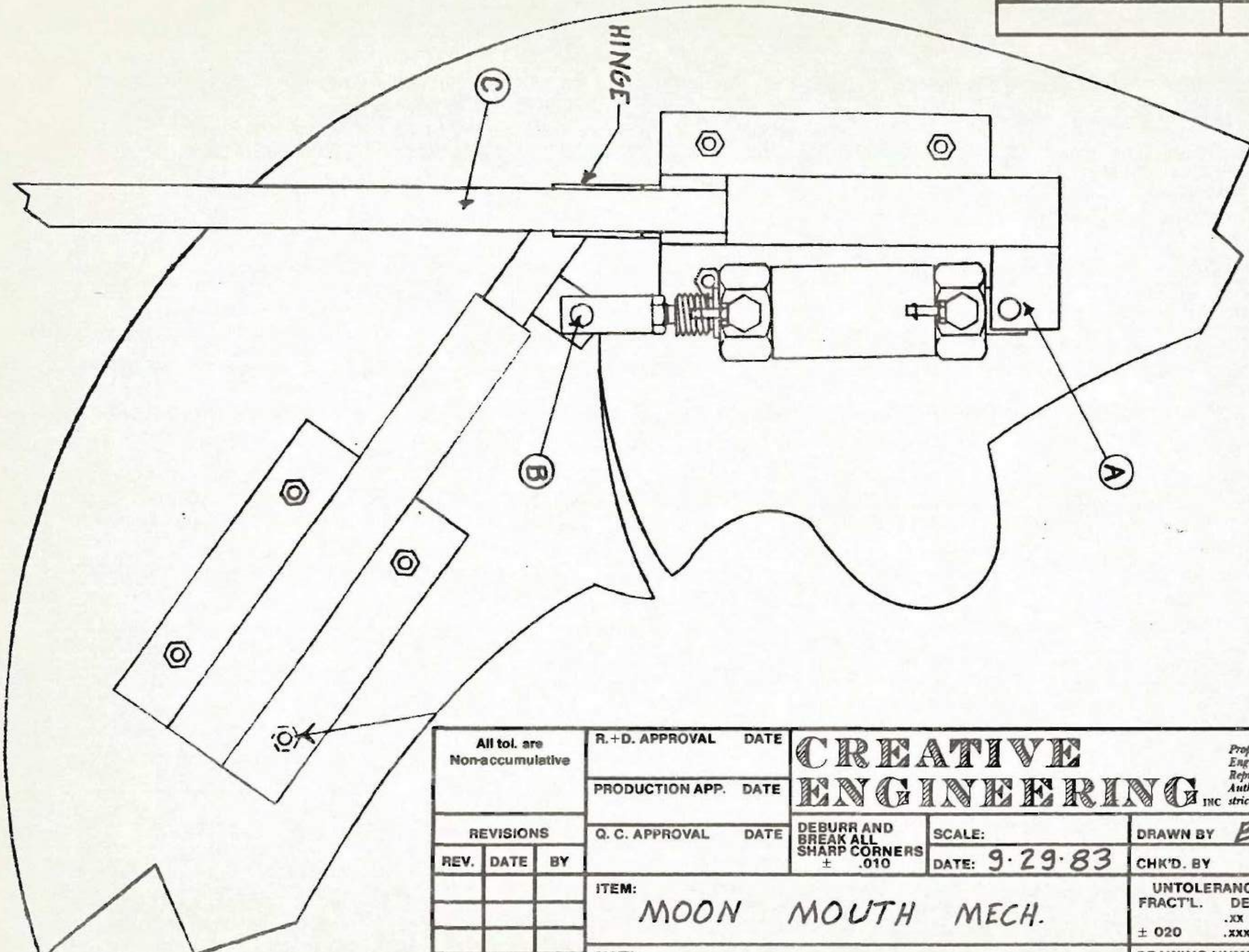
   b. Keep the set screws tight, if the pivot hole elongates or enlarges replace the mount.

   c. Drill out and re-tap the set screws holes to the next larger Tap size, if necessary.



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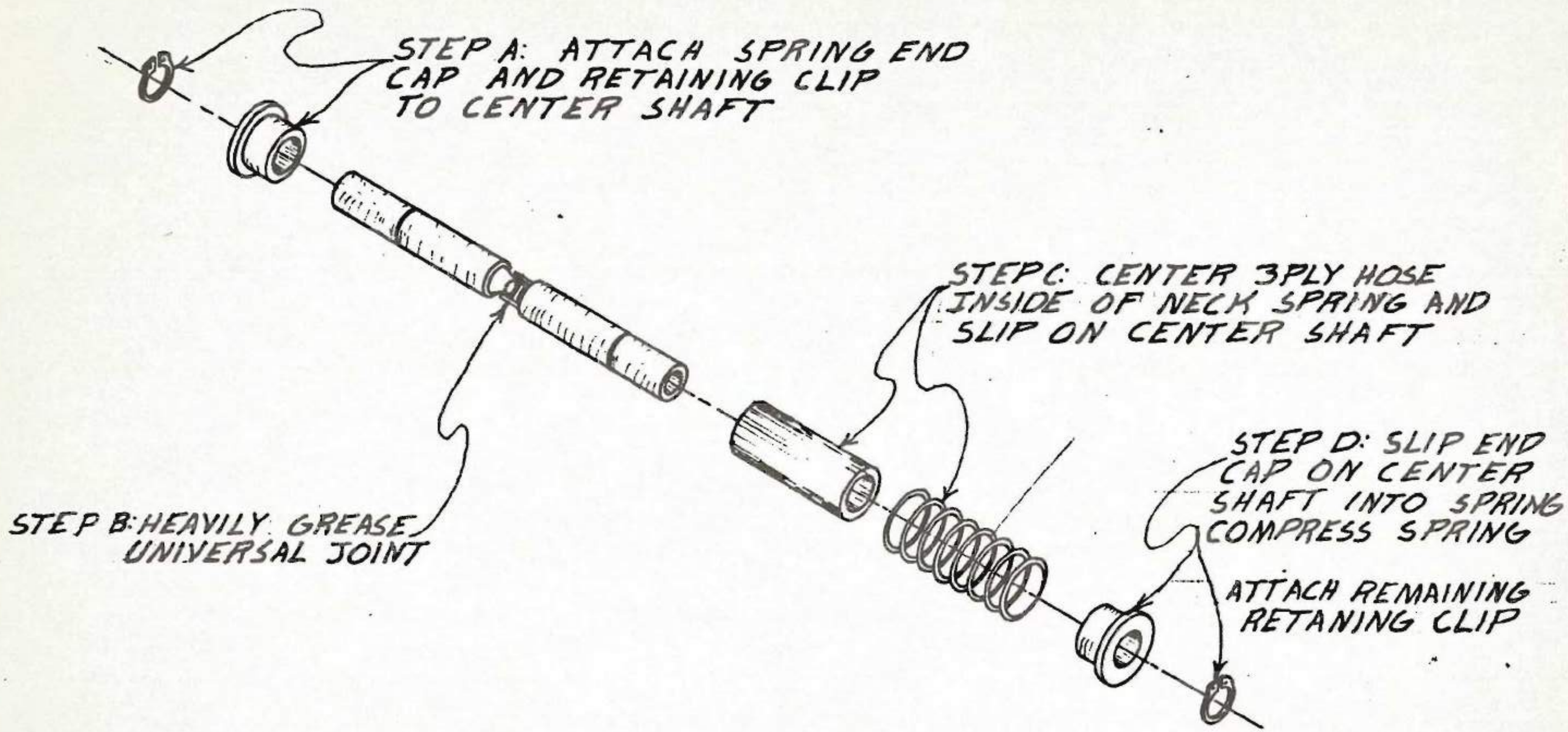
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REV. / DATE / BY		DATE: 9·29·83 / CHK'D. BY
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	MAT'L:	DRAWING NUMBER 3 83



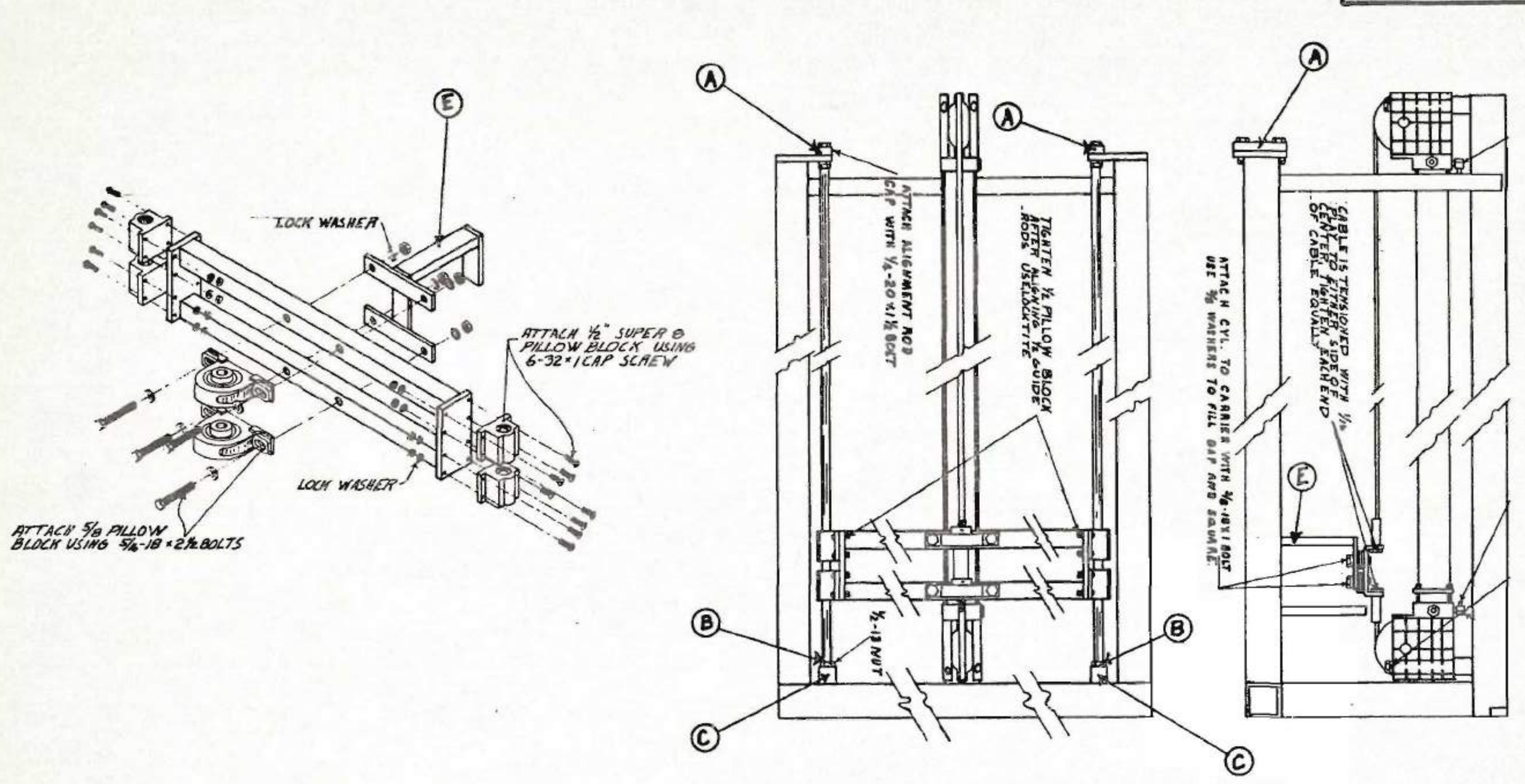
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	MAT'L:				DRAWING NUMBER 3-085	



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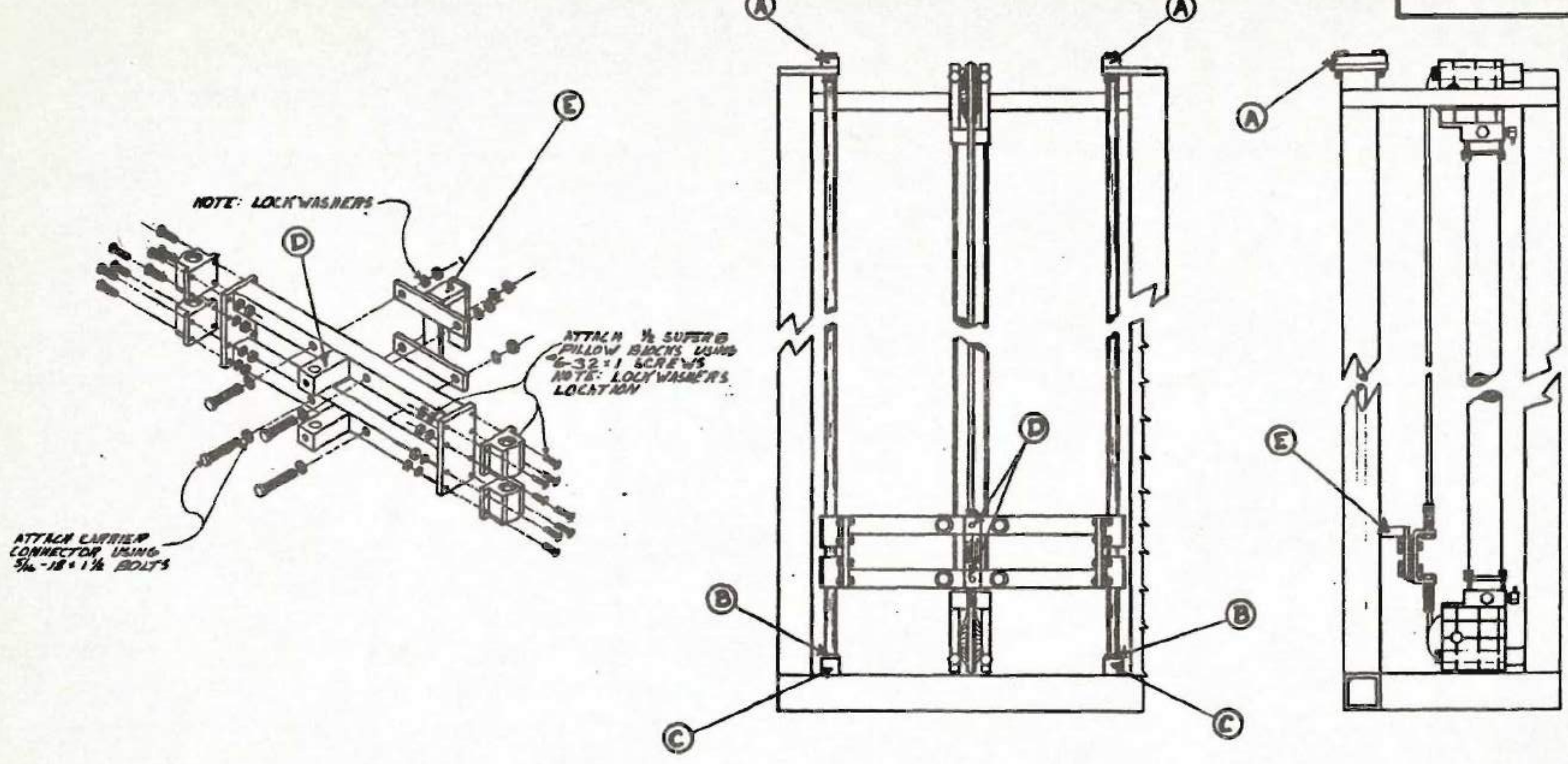
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ITEM: LOONEY BIRD CARRIER

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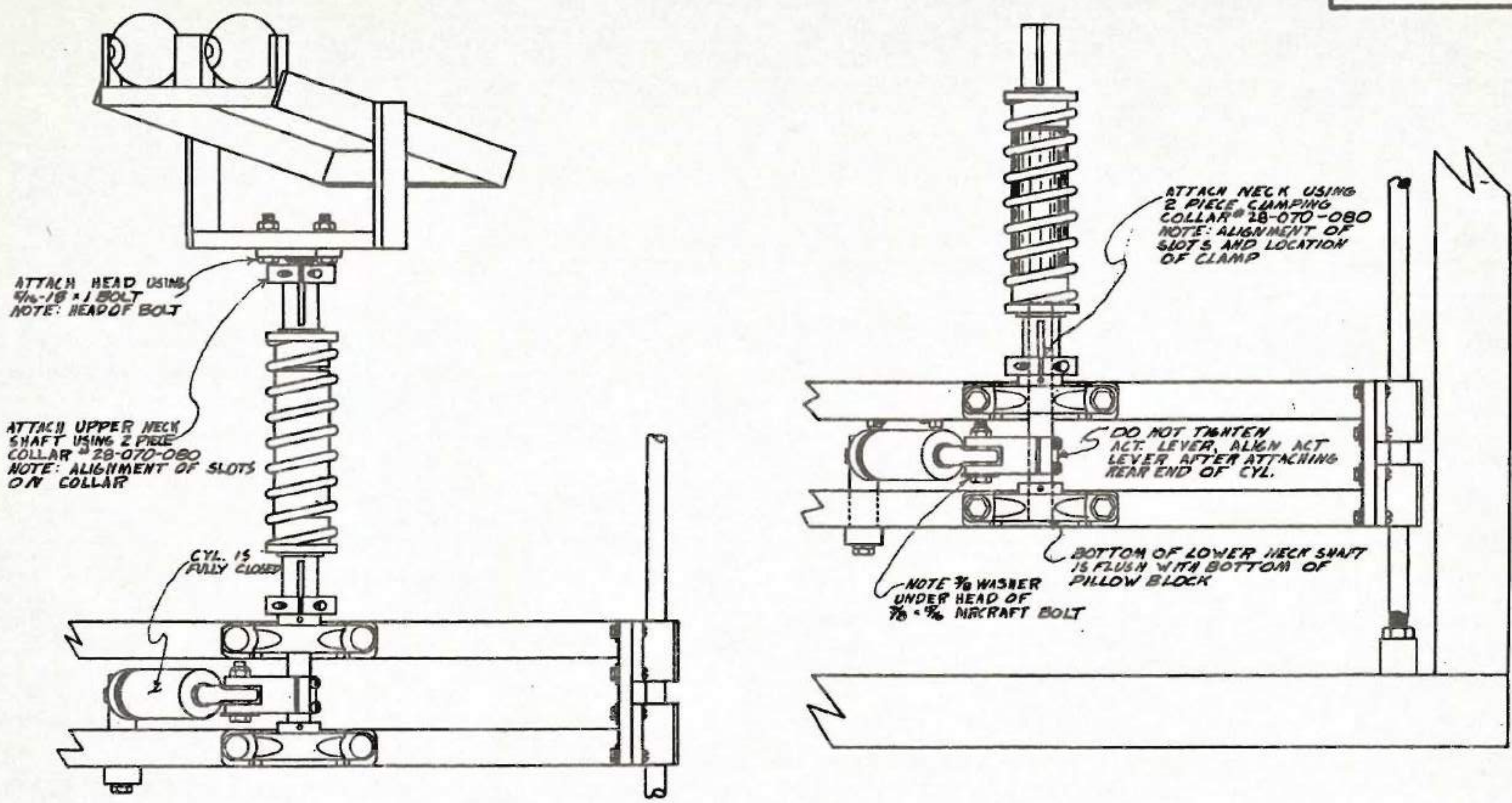
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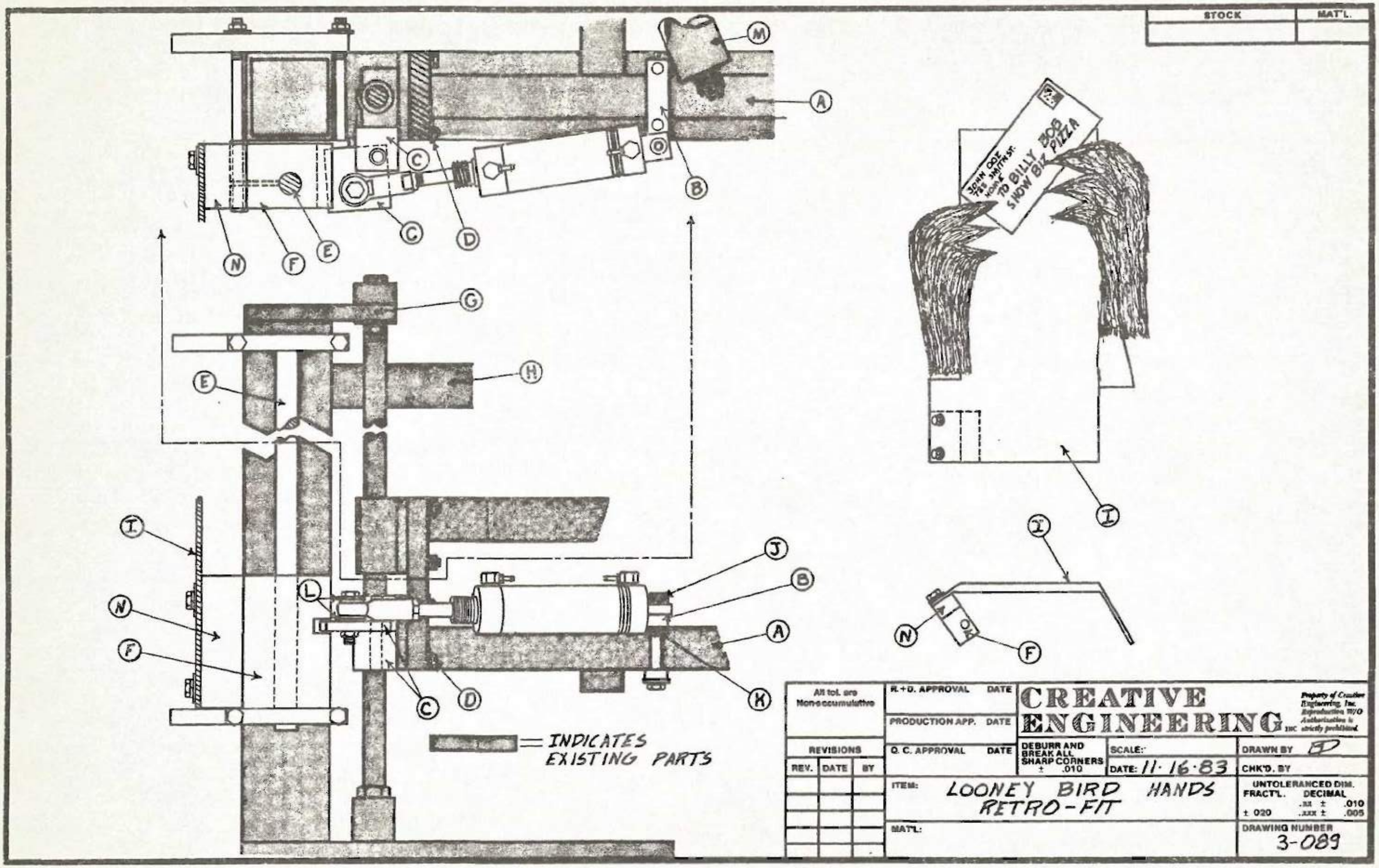
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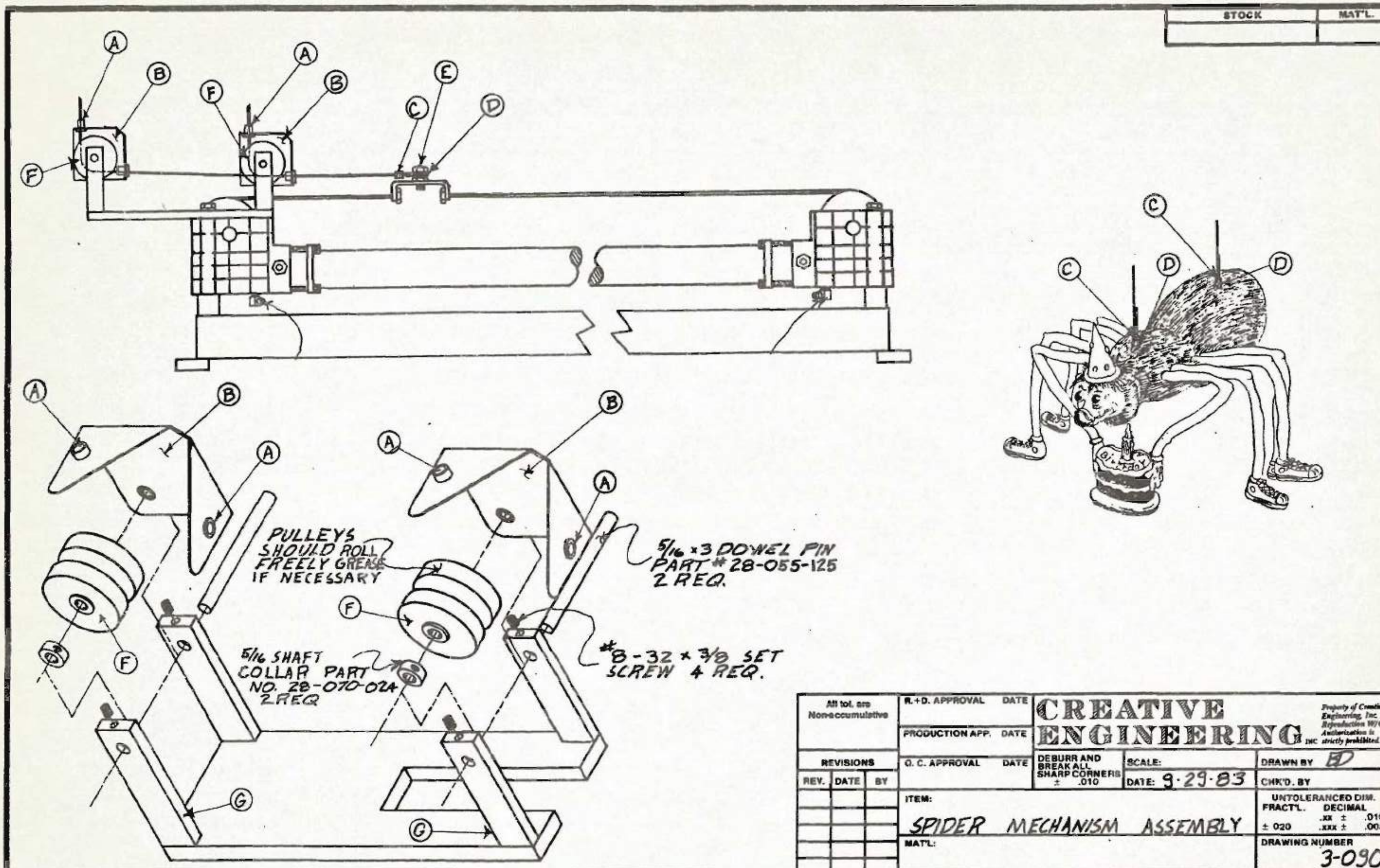
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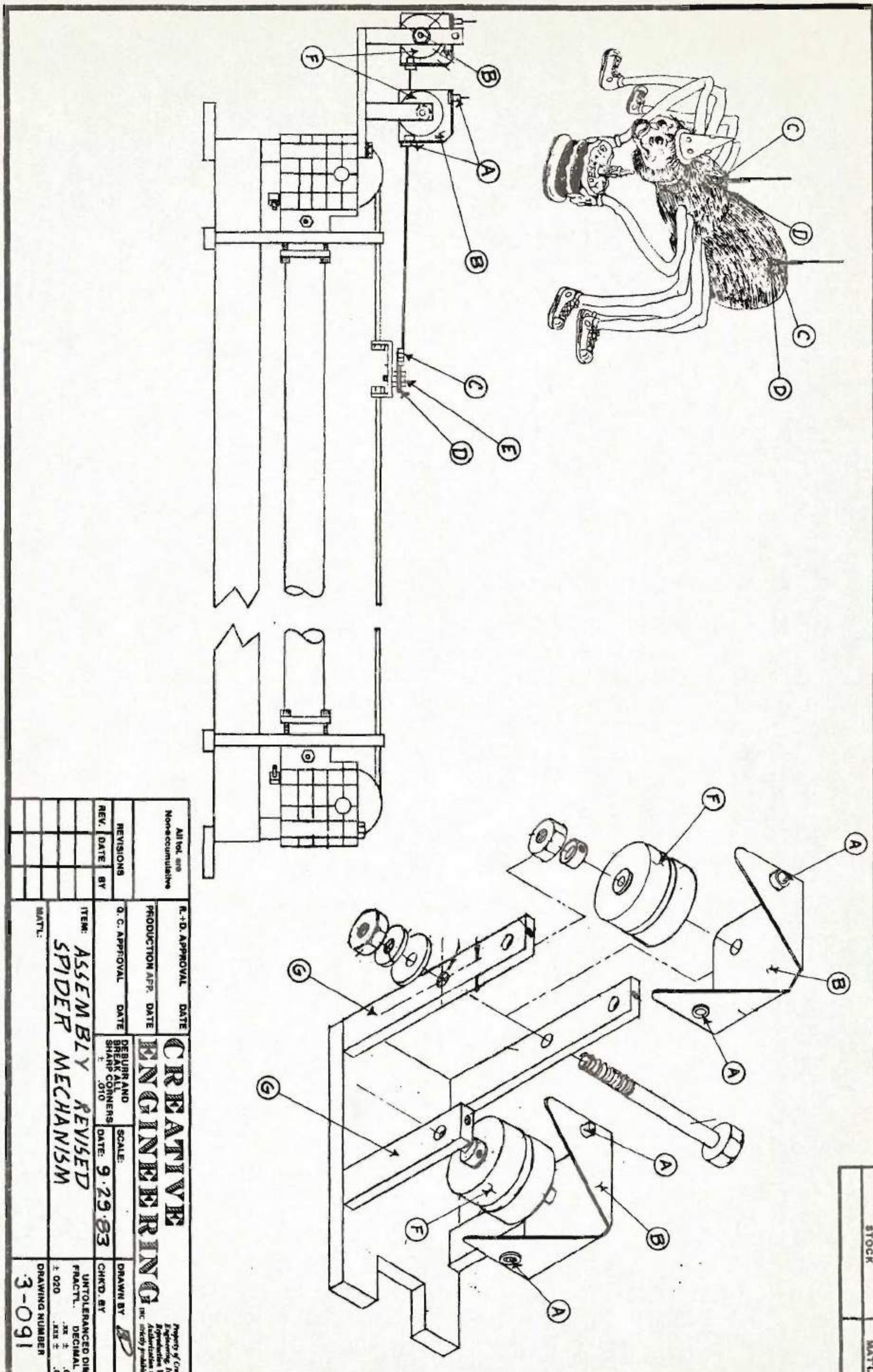
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REV. / DATE / BY			DATE: 9-23-83	CHK'D. BY	
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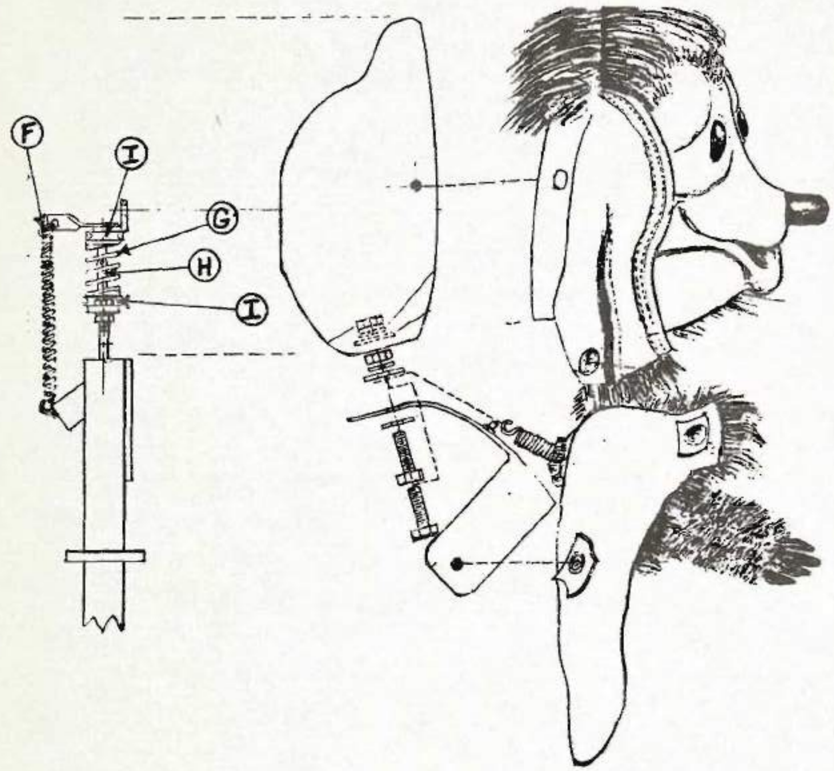

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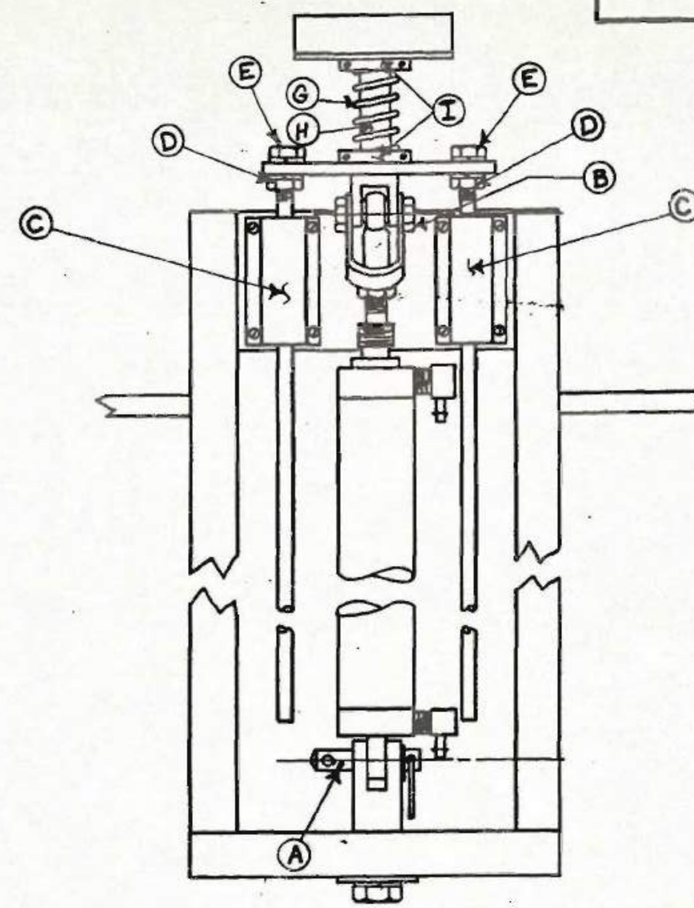


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	MAT'L:	DRAWING NUMBER 3-090



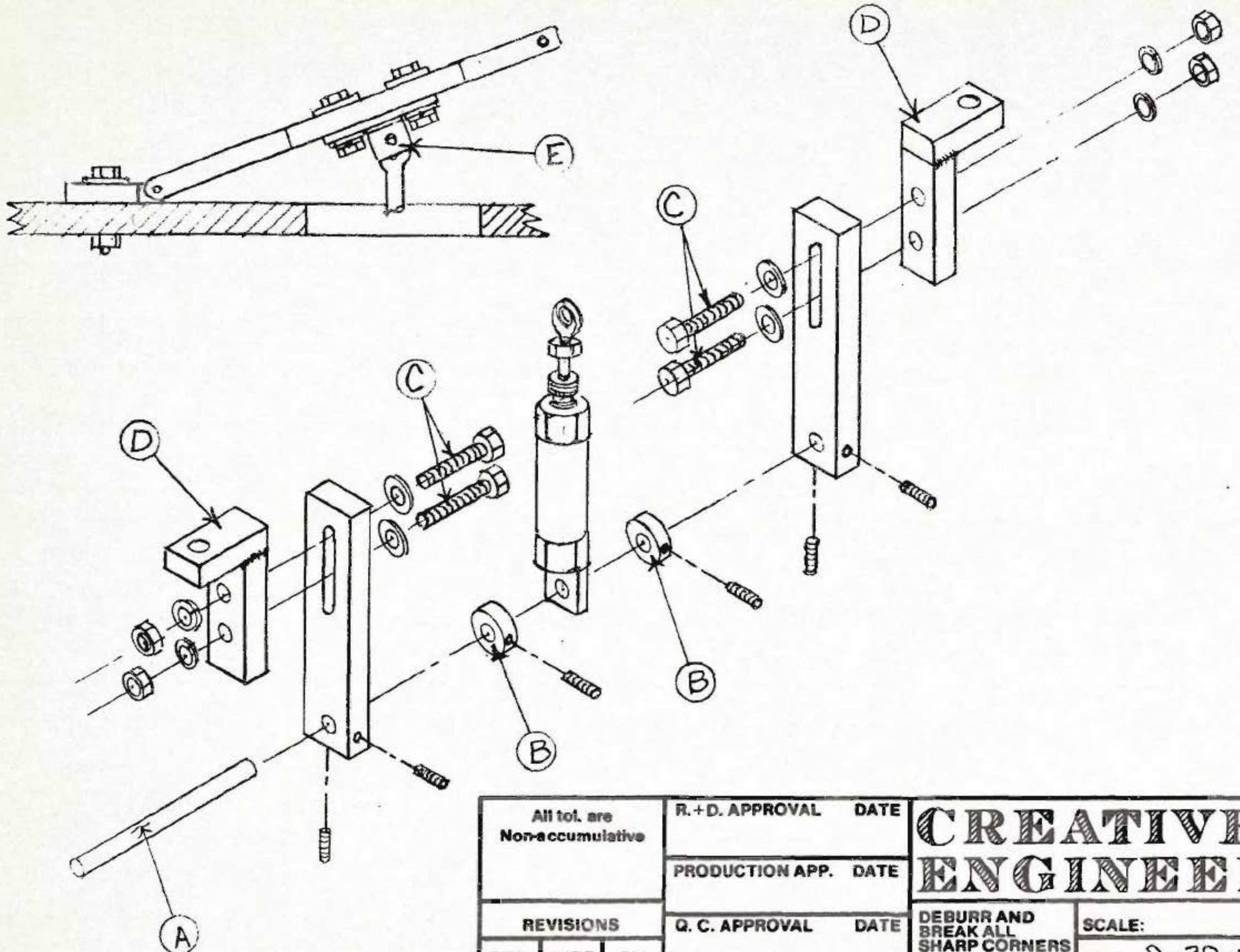
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MAT'L:
UNTOLERANCED DIM.
FRACT'L. ± .020
DECIMAL .XX ± .010 .XXX ± .005
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	MAT'L:		DRAWING NUMBER 3-092

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REV. DATE BY			DATE: 9-30-83	CHK'D. BY
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	MAT'L:			DRAWING NUMBER 3-093

INTRODUCTION
CRITICAL ADJUSTMENTS

Description: The following text deals with the Critical Adjustments on each movement, and in every character. Keeping the characters adjusted properly will reduce breakdown of the characters. All Critical Adjustments will be made using the angular dimension, unless otherwise noted in the drawing. The Pin to Pin dimensions on the Critical Adjustment Charts are approximate. The Pin to Pin dimensions refered to, is a measurement from the center of the front cylinder mount hole, to the center of the rear cylinder mount hole. On the Critical Adjustment Charts a (+) or (-) tolerance is refered to, this means that the Pin to Pin or angular dimension can vary the allotted amount.
(Example: The Pin to Pin on Rolfe's ear is 4 5/8" +-1/8", or a Pin to Pin from 4 1/2" to 4 3/4". And the angle on Rolfe's ear is 90 degrees +-2 degrees, or an angle from 88 degrees to 92 degrees.)
Refer to the drawing on Page 102 for an explanation on the proper use of a protractor.

Contents:

Critical Adjustment Chart

Rolfe and Earl

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree	Tolerance On Angle	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	N/A	103
Left, Right Ear	C.C.	4 5/8"	90 D.	+-2 D.	104
Eye Lids*	C.C.	7 3/8"	N/A	N/A	106
Left, Right Eyes	R.C. F.O.	8 11/16"	90 D.	+-1 D.	108
Head Left*	C.C.	3 3/8"	N/A	N/A	110
Head Right*	C.C.	3 3/8"	110 D.	+-1 D.	110
Head Up, Down	C.O.	8 9/16"	13 D.	+-1 D.	111
Left Arm Raise	C.C.	9"	125 D.	+-1 D.	114
Right Arm Raise	C.C.	6 3/8"	120 D.	+-1 D.	115
Left Elbow	C.C.	6 3/4"	55 D.	+-1 D.	116
Left Arm Twist	C.C.	4"	90 D.	+-1 D.	117
Right Arm Twist	C.C.	5 1/2"	90 D.	+-1 D.	119
Right Elbow Twist	C.C.	7 7/8"	90 D.	+-1 D.	122
Head Tilt Earl	C.C.	7 15/16"	119 D.	+-1 D.	122
Earl's Mouth	C.C.	3 3/4"	90 D.	N/A	124
Earl's Eyebrow	C.C.	4 9/16"	N/A	N/A	124
Body Turn	R.O. F.C.	7 3/4"	0 D.	+-1 D.	126
Body Lean	C.O.	10 3/8"	6 D.	+-1 D.	126

R.C. F.O. Rear Cylinder Closed, Front Cylinder Open
(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open
R.O.F.C. Rear Cylinder Open, Front Cylinder Closed

Critical Adjustment Chart
Dook

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree	Tolerance On Angle	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	N/A	103
Left, Right Ear	C.C.	4 1/2"	30 D.	+-2 D.	105
Eye Lids*	C.C.	7 3/16"	N/A	N/A	107
Left, Right Eyes*	R.C. F.O.	8 11/16"	90 D.	+-1 D.	108
Head Left*	C.C.	3 3/8"	N/A	N/A	110
Head Right*	C.C.	3 3/8"	110 D.	+-1 D.	110
Head Up, Down	C.O.	8 1/2"	15 D.	+-1 D.	111
Left Arm Swing	C.O.	4 11/16"	52 D.	+-1 D.	120
Right Arm Swing	C.O.	5 3/4"	60 D.	+-1 D.	120
Left, Right Elbow	C.C.	7 3/16"	87 D.	+-1 D.	121
Body Lean	C.O.	9 7/8"	2 D.	+-1 D.	126
Cymbals*	C.O.	7 5/16"	18 D.	+-2 D	129
Base Drum*	C.O.	7 3/8"	23 D.	+-2 D.	129

R.C. F.O. Rear Cylinder Closed, Front Cylinder Open
(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open

Critical Adjustment Chart

Billy Bob

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree On Angle	Tolerance	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	+-1 D.	103
Eye Lids*	C.O.	7 3/16"	N/A	N/A	107
Left, Right Eyes*	R.C. F.O.	8 11/16"	90 D.	+-1 D.	108
Head Left*	C.C.	3 3/8"	N/A	N/A	110
Head Right*	C.C.	3 3/8"	110 D.	+-1 D.	110
Head Tip Left, Rt.	R.O. F.C.	8 11/16"	90 D.	+-1 D.	112
Head Up	C.O.	7 1/8"	23 D.	+-1 D.	112
Right Arm Raise	C.C.	6 5/8"	128 D.	+-1 D.	115
Right Arm Twist	C.O.	6 1/16"	90 D.	+-1 D.	118
Right Elbow Twist	C.O.	8 3/16"	45 D.	+-1 D	123
Right Wrist	C.C.	7 5/8"	35 D.	+-1 D.	123
Left Hand Slide*	C.C.	N/A	N/A	N/A	125
Guitar Raise*	C.O.	9 7/8"	N/A	N/A	125
Body Turn	R.C. F.O.	7 11/16"	0 D.	+-1 D.	126
Body Lean	C.C.	9 1/8\	7 D.	+-1 D.	126
Foot Tap	C.O.	7 3/16"	90 D.	+-2 D.	127

R.C. F.O. Rear Cylinder Closed, Front Cylinder Open
(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open
R.O.F.C. Rear Cylinder Open, Front Cylinder Closed

Critical Adjustment Chart

Beach Bear

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree	Tolerance On Angle	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	N/A	103
Eye Lids*	C.C.	7 3/16"	N/A	N/A	107
Eye Cross*	C.C.	5 5/8"	N/A	N/A	109
Head Left*	C.C.	3 3/8"	N/A	N/A	110
Head Right*	C.C.	3 3/8"	110 D.	+-1 D.	110
Head Up, Down	C.O.	8 1/2"	10 D.	+-1 D.	111
Right Arm Raise	C.C.	6 1/4"	117 D.	+-1 D.	115
Right Arm Twist	C.O.	6 1/16"	90 D.	+-1 D.	118
Right Elbow Twist	C.O.	8 3/16"	45 D.	+-1 D.	123
Right Wrist	C.O.	9 1/4"	35 D.	+-1 D.	123
Left Hand Slide*	C.C.	N/A	N/A	N/A	125
Guitar Raise*	C.O.	9 7/8"	N/A	N/A	125
Body Lean	C.C.	8 7/8"	8 D.	+-1 D.	126
Left, Rt. Leg Kick	C.C.	7 3/8"	70 D.	+-2 D.	128

R.C. F.O. Rear Cylinder Closed, Front Cylinder Open
(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open

Critical Adjustment Chart

Mitzi

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree On Angle	Tolerance	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	N/A	103
Left, Right Ear	C.C.	4 5/8"	90 D.	+-1 D.	104
Eye Lids*	C.C.	7 3/8"	N/A	N/A	106
Left, Right Eyes*	R.C. F.O.	8 11/16"	90 D.	+-1 D.	108
Head Left*	C.C.	3 3/8"	N/A	N/A	110
Head Right*	C.C.	3 3/8"	110 D.	+-1 D.	110
Head Up, Down	C.O.	8 3/16"	10 D.	+-1 D.	111
Left Arm Raise	C.C.	8 1/2"	125 D.	+-1 D.	114
Right Arm Raise	C.C.	8 1/2"	125 D.	+-1 D.	115
Left, Right Elbow	C.O.	8 1/8"	15 D.	+-2 D.	116
Left Arm Twist	C.O.	4 3/4"	90 D.	+-1 D.	117
Right Arm Twist	C.O.	4 3/4"	90 D.	+-1 D.	117
Body Twist	R.C. F.O.	7 7/8"	0 D.	+-1 D.	126
Body Lean	C.O.	10 9/16"	0 D.	+-1 D.	126

R.C. F.O. Rear Cylinder Closed, Front Cylinder Open
(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open

Critical Adjustment Chart

Fatz

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree	Tolerance On Angle	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	N/A	103
Eye Lids*	C.C.	7 3/8"	N/A	N/A	106
Left, Right Eyes*	R.C. F.O.	8 11/16"	90 D.	+-1 D.	108
Head Left*	C.C.	3 3/8"	N/A	N/A	110
Head Right*	C.C.	3 3/8"	110 D.	+-1 D.	110
Head Tip Left, Rt.	F.C. R.O.	7 1/2"	0 D.	+-1 D.	113
Head Up, Down	C.C.	6 1/4"	70 D.	+-1 D.	113
Left Arm Swing	C.O.	4 7/8"	125 D.	+-1 D.	120
Right Arm Swing	C.O.	4 7/8"	125 D.	+-1 D.	120
Left, Right Elbow	C.C.	7 1/4"	85 D.	+-2 D.	121
Body Lean	C.C.	8 3/4"	34 D.	+-1 D.	126
Foot Tap	C.O.	7 3/16"	90 D.	+-2 D.	127

R.C. F.O. Rear Cylinder Closed, Front Cylinder Open
(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open

Critical Adjustment Chart

Looney Bird

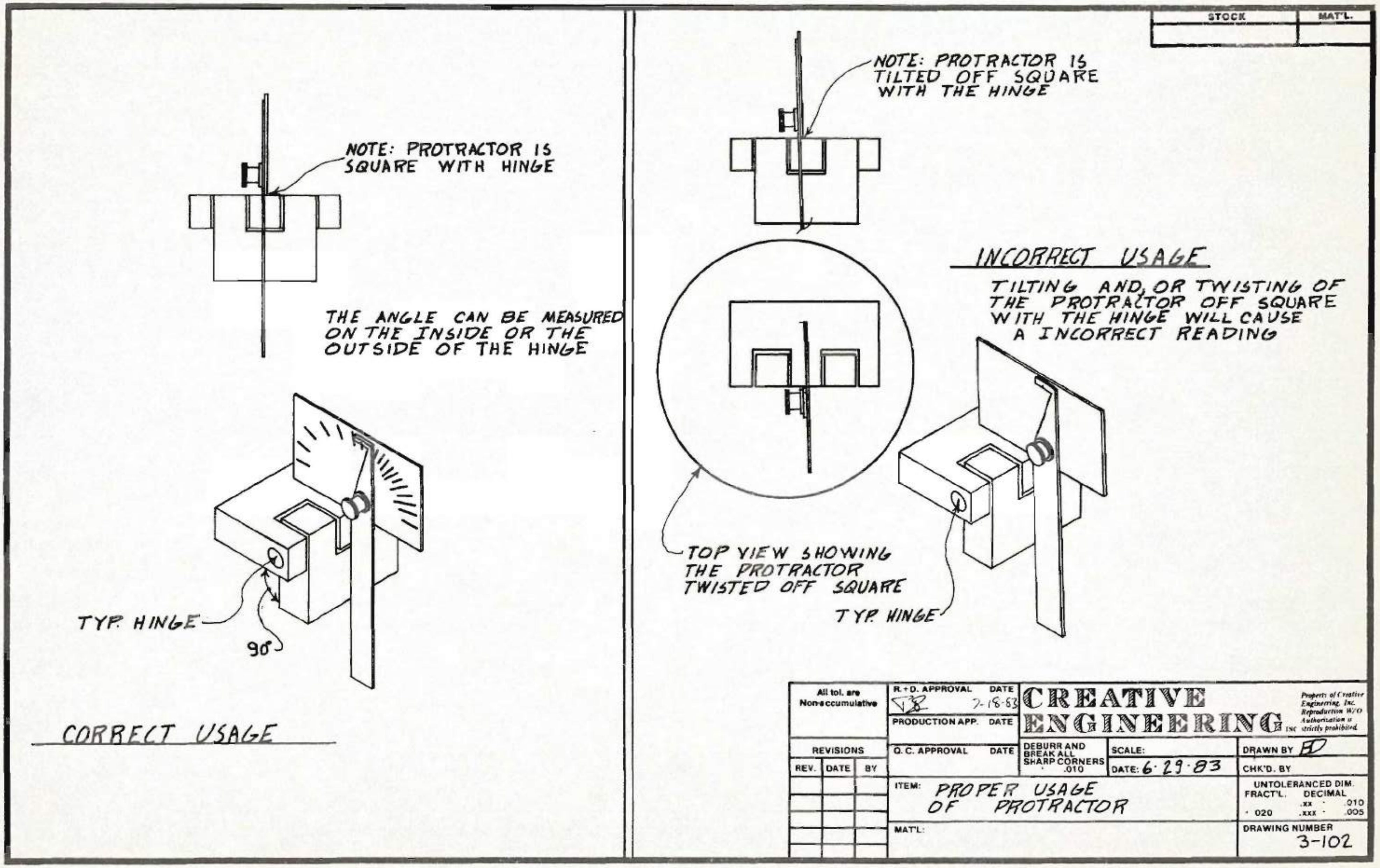
Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree	Tolerance On Angle	Drawing Page #
Mouth Lever*	C.C.	7 1/4"	90 D.	N/A	103
Eye Lids*	C.C.	7 5/16"	N/A	N/A	106
Eye Cross*	C.C.	5 5/8"	N/A	N/A	109
Head Left	C.C.	7 11/16"	N/A	N/A	130
Head Raise*	C.C.	10 1/2"	N/A	N/A	131

Critical Adjustment Chart

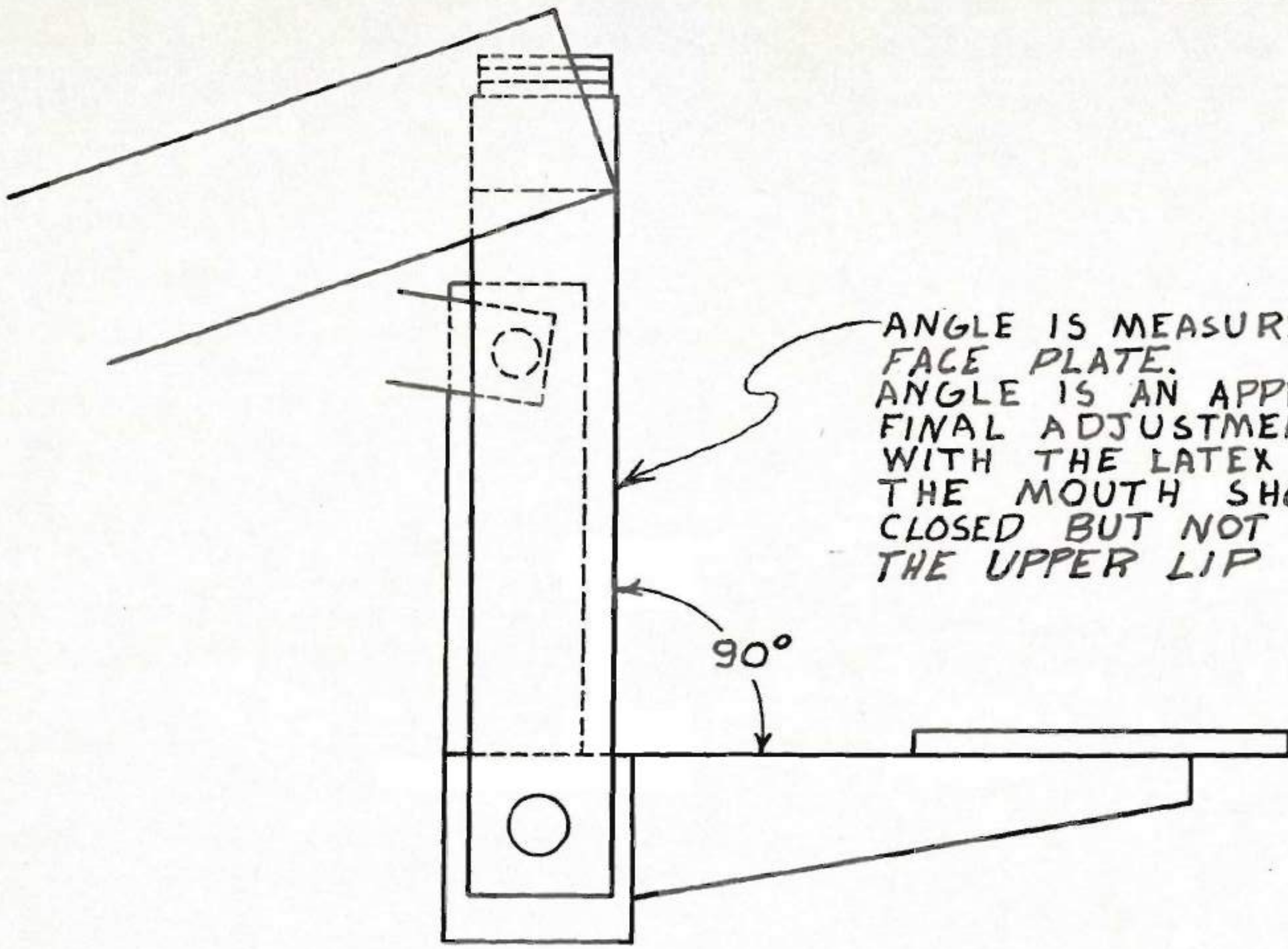
Props

Description	Cyl. Open Cyl. Closed	Cyl. Pin to Pin +- 1/8"	Degree	Tolerance On Angle	Drawing Page #
Sun Mouth*	C.C.	6 7/8"	N/A	N/A	132
Sun Raise*	C.C.	12 1/2"	N/A	N/A	132
Moon Mouth*	C.C.	6 1/2"	55 D.	N/A	133
Moon Raise*	C.C.	17 1/2"	N/A	N/A	133
Spider*	N/A	N/A	N/A	N/A	134
Baby Bear*	C.C.	16 1/4"	N/A	N/A	135

(*) Information on the chart is not complete, refer to the Drawing.
C.C. Cylinder Closed
C.O. Cylinder Open


STOCK
MAT'L.
NOTE: PROTRACTOR IS SQUARE WITH HINGE
THE ANGLE CAN BE MEASURED ON THE INSIDE OR THE OUTSIDE OF THE HINGE
TYP. HINGE
90°
CORRECT USAGE
NOTE: PROTRACTOR IS TILTED OFF SQUARE WITH THE HINGE
INCORRECT USAGE
TILTING AND, OR TWISTING OF THE PROTRACTOR OFF SQUARE WITH THE HINGE WILL CAUSE A INCORRECT READING
TOP VIEW SHOWING THE PROTRACTOR TWISTED OFF SQUARE
TYP. HINGE
All tol. are Non-accumulative
REVISIONS
REV. DATE BY
R.+D. APPROVAL DATE 2-18-83
PRODUCTION APP. DATE
Q. C. APPROVAL DATE
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DEBURR AND BREAK ALL SHARP CORNERS .010
SCALE:
DATE: 6·29·83
DRAWN BY
CHK'D. BY
ITEM: PROPER USAGE OF PROTRACTOR
UNTOLERANCED DIM.
FRACT'L. ·020
DECIMAL .XX ·.010 .XXX ·.005
MAT'L:
DRAWING NUMBER 3-102

STOCK	MAT'L.



All tol. are Non-accumulative

R.+D. APPROVAL: ~~ DATE: 7-83

PRODUCTION APP. DATE

Q. C. APPROVAL DATE

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REVISIONS		
REV.	DATE	BY

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE: ——

DATE: 6·22·83

DRAWN BY: BD

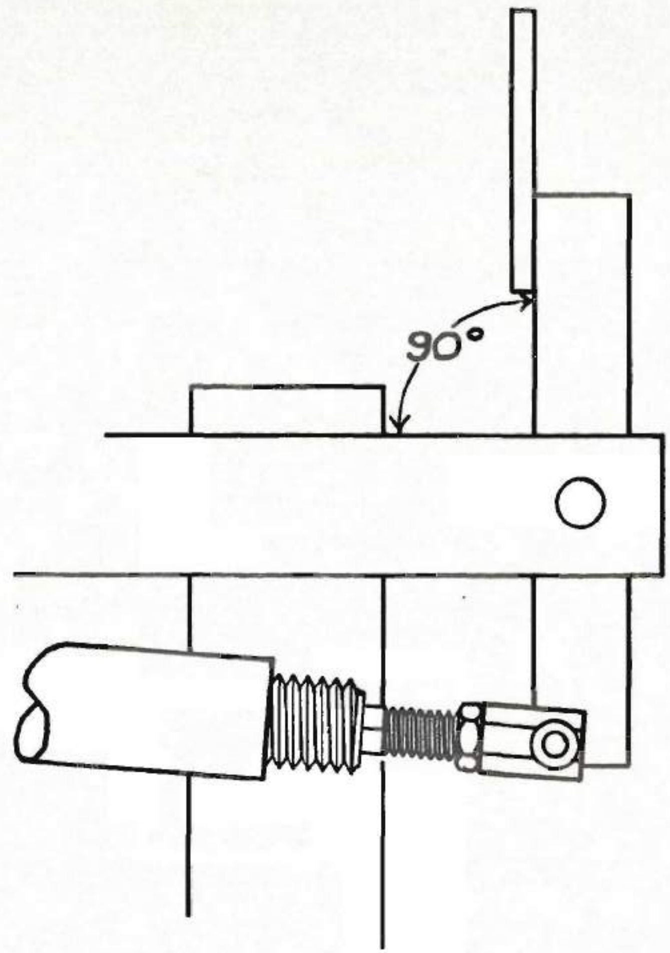
CHK'D. BY

ITEM: SIDE VIEW OF HEAD SHOWING MOUTH LEVER ONLY

~~UNTOLERANCED DIM. FRACT'L. DECIMAL .XX ± .010 ± .020 .XXX ± .005~~

MAT'L:

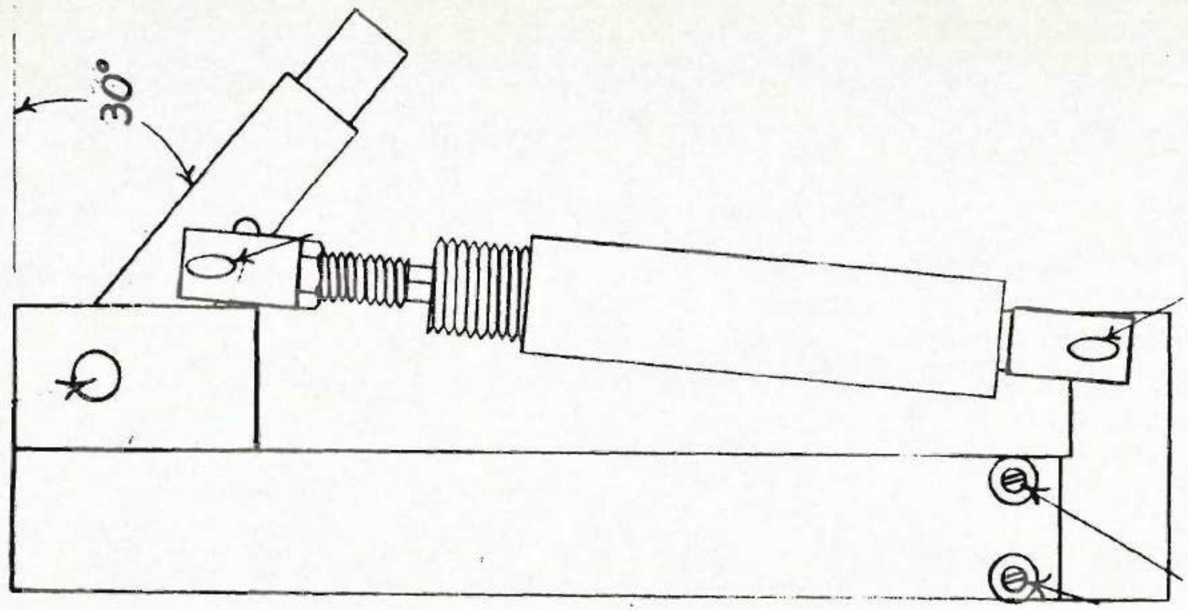
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STOCK	MAT'L.

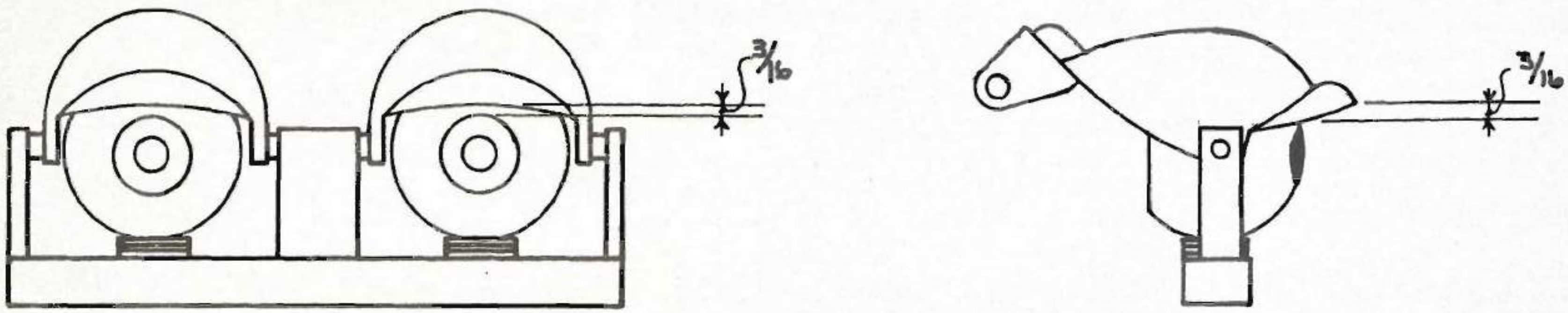
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REVISIONS: REV. / DATE / BY	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 — SCALE: — DATE: 10·11·83 — DRAWN BY BD — CHK'D. BY
	ITEM: MITZI, ROLFE EAR	UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:	DRAWING NUMBER 3-10

STOCK	MAT'L.



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REV. / DATE / BY			DATE: 10·11·83	CHK'D. BY
	ITEM: DOOK'S EAR			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-105

STOCK	MAT'L.



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SCALE:

DATE: 10·11·83

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REVISIONS		
REV.	DATE	BY

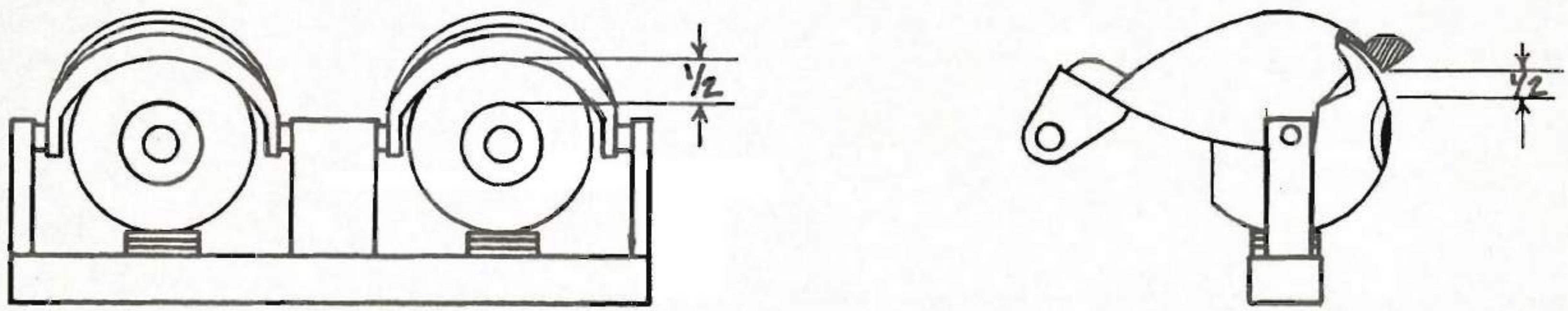
ITEM: EYELID ADJUSTMENT ROLFE, MITZI, FATZ, LOONEY BIRD

MAT'L:

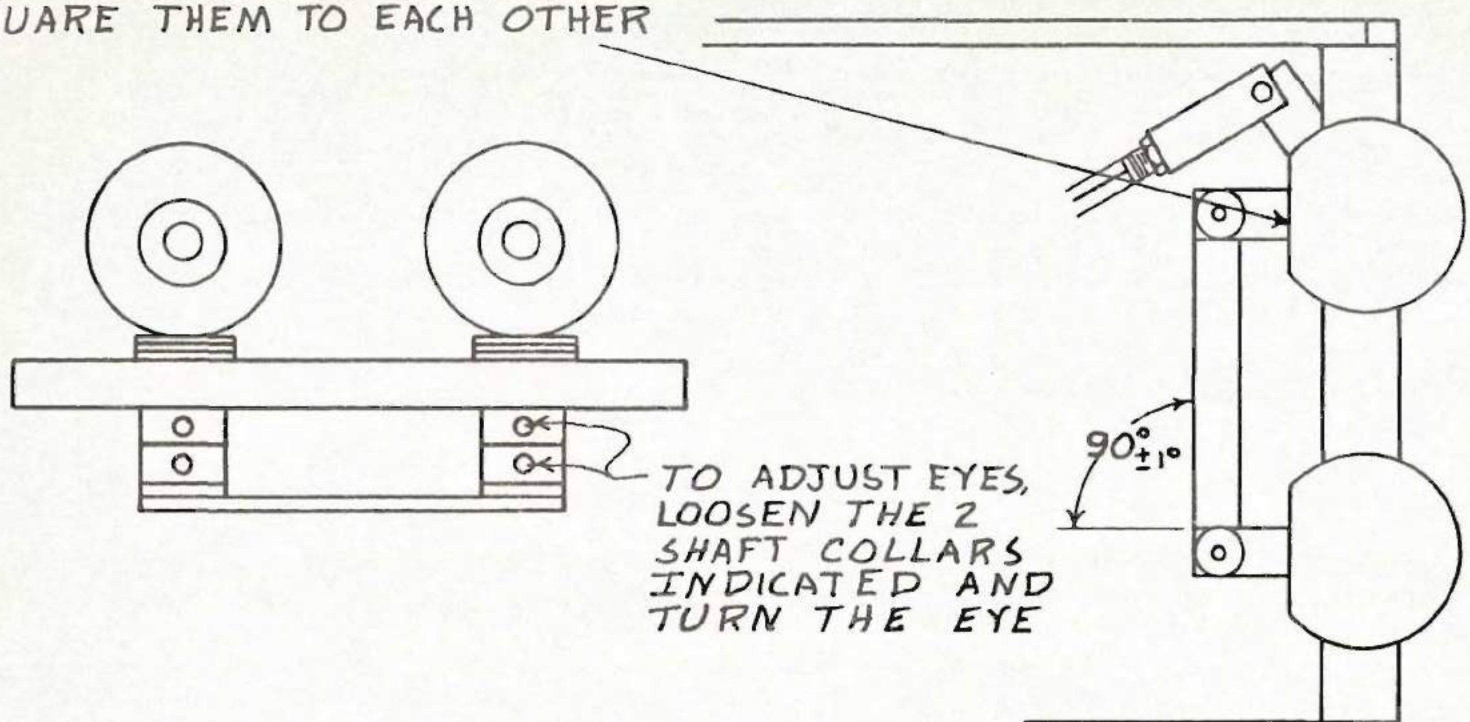
UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .xx ± .010 .xxx ± .005

DRAWING NUMBER 3-10[illegible]

STOCK	MAT'L.



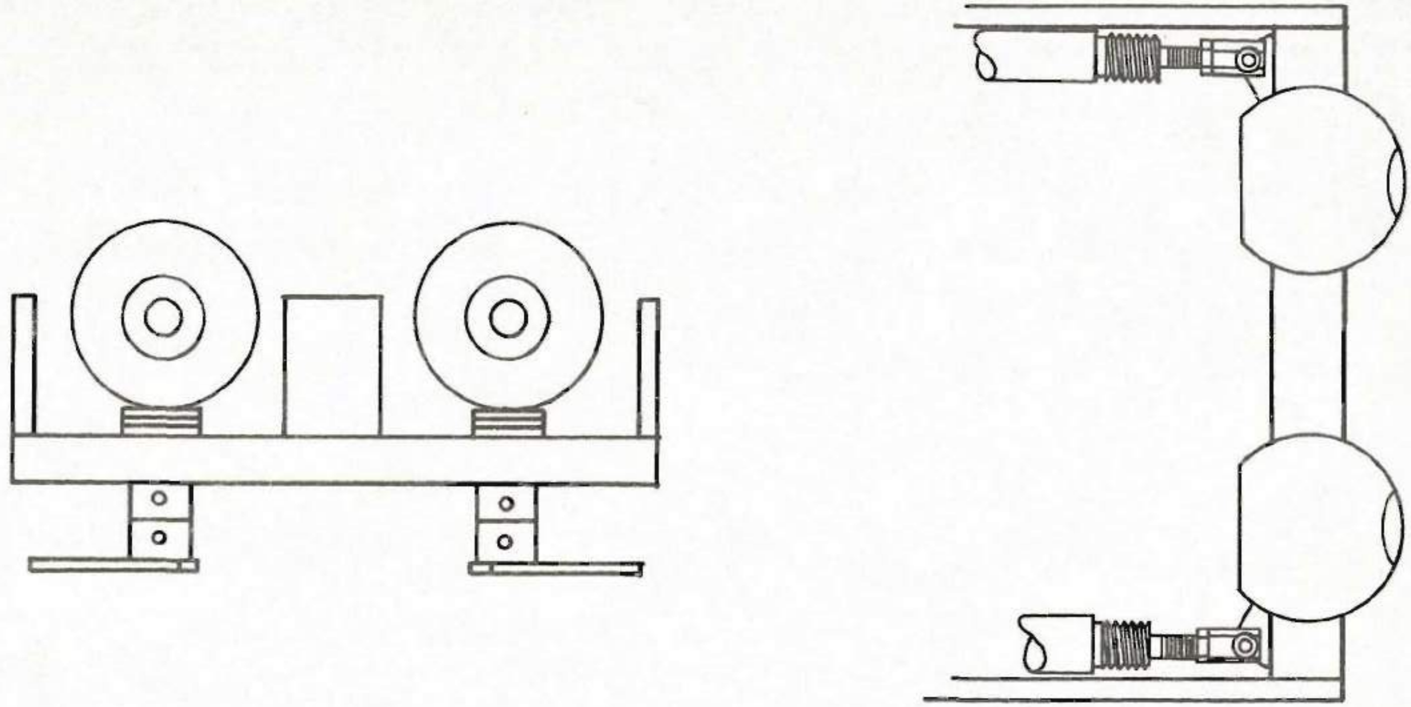
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REV. / DATE / BY			DATE: 10·11·83	CHK'D. BY
	ITEM: EYELID ADJUSTMENT DOOK, BILLY BOB, BEACH BEAR			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-107



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REV. DATE BY			DATE: 6·22·83	CHK'D. BY
	ITEM: TOP AND FRONT VIEW SHOWING EYES ONLY			~~UNTOLERANCED DIM. FRACT'L. DECIMAL .XX .010 ±.020 .XXX .005~~
	MAT'L:			DRAWING NUMBER 3-108

STOCK	MAT'L.

STOCK	MAT'L.



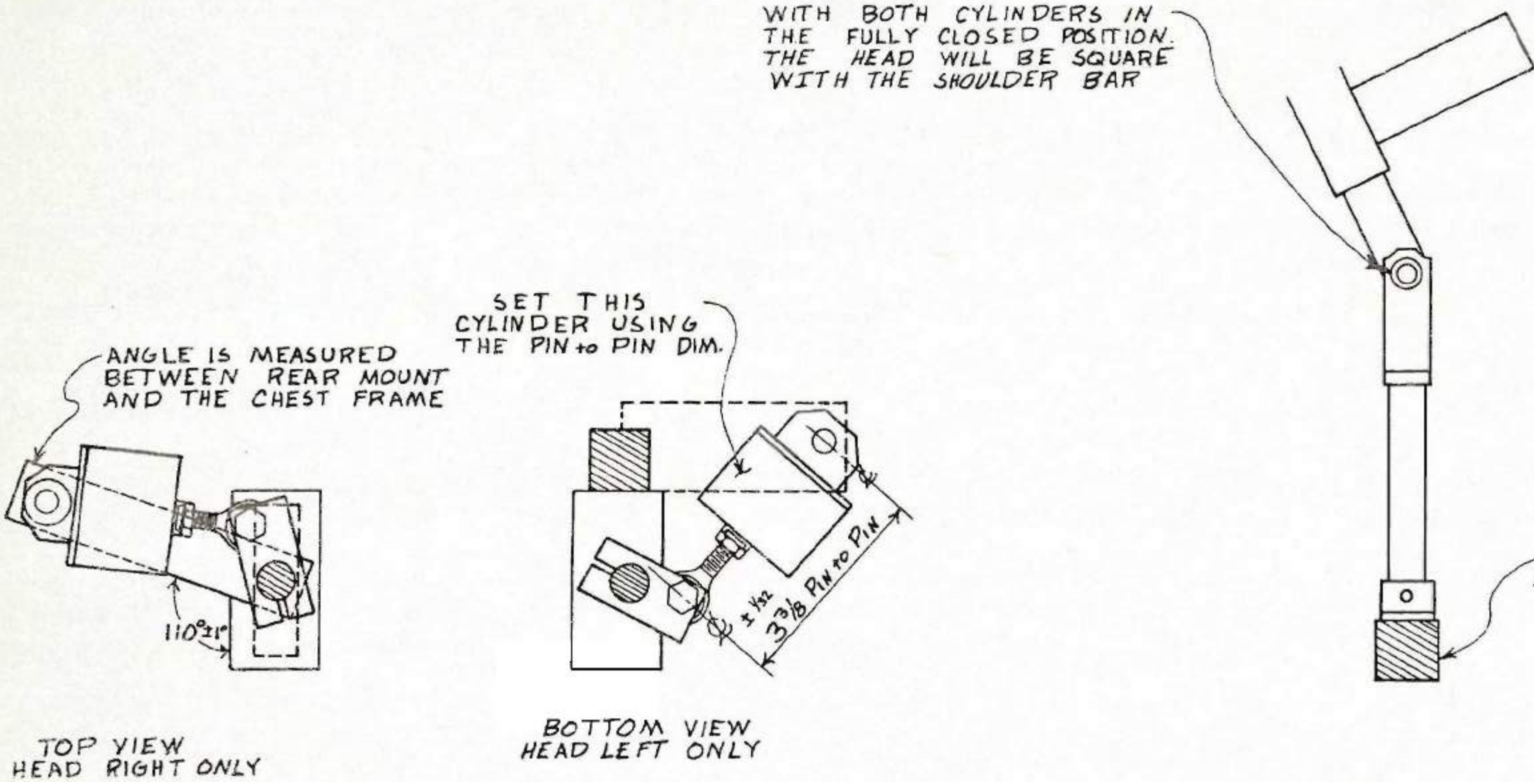
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REV. / DATE / BY			DRAWN BY ED / CHK'D. BY

ITEM: EYE CROSS
LOONEY BIRD, BEACH BEAR

MAT'L:

UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .xx ± .010 .xxx ± .005

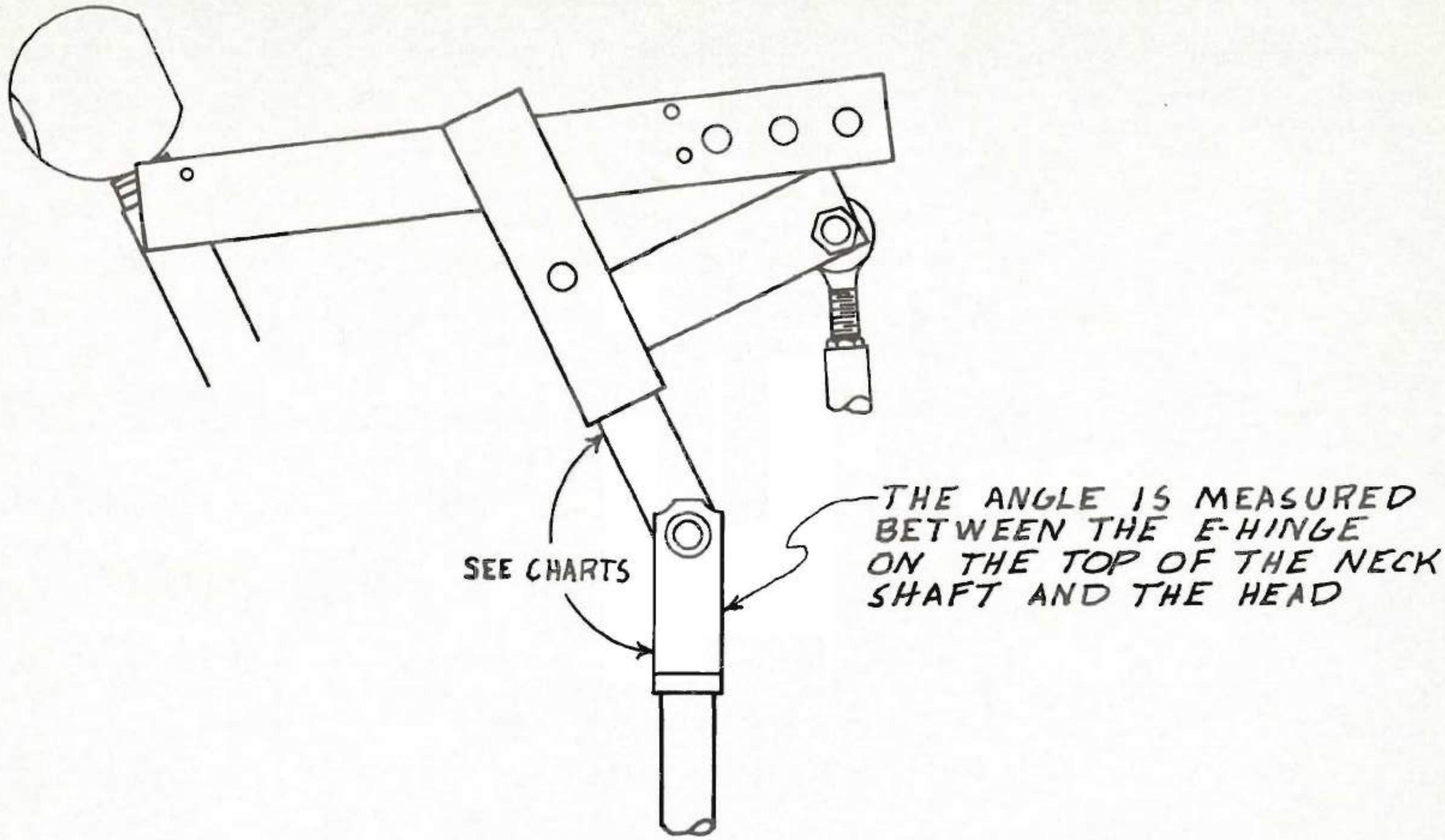
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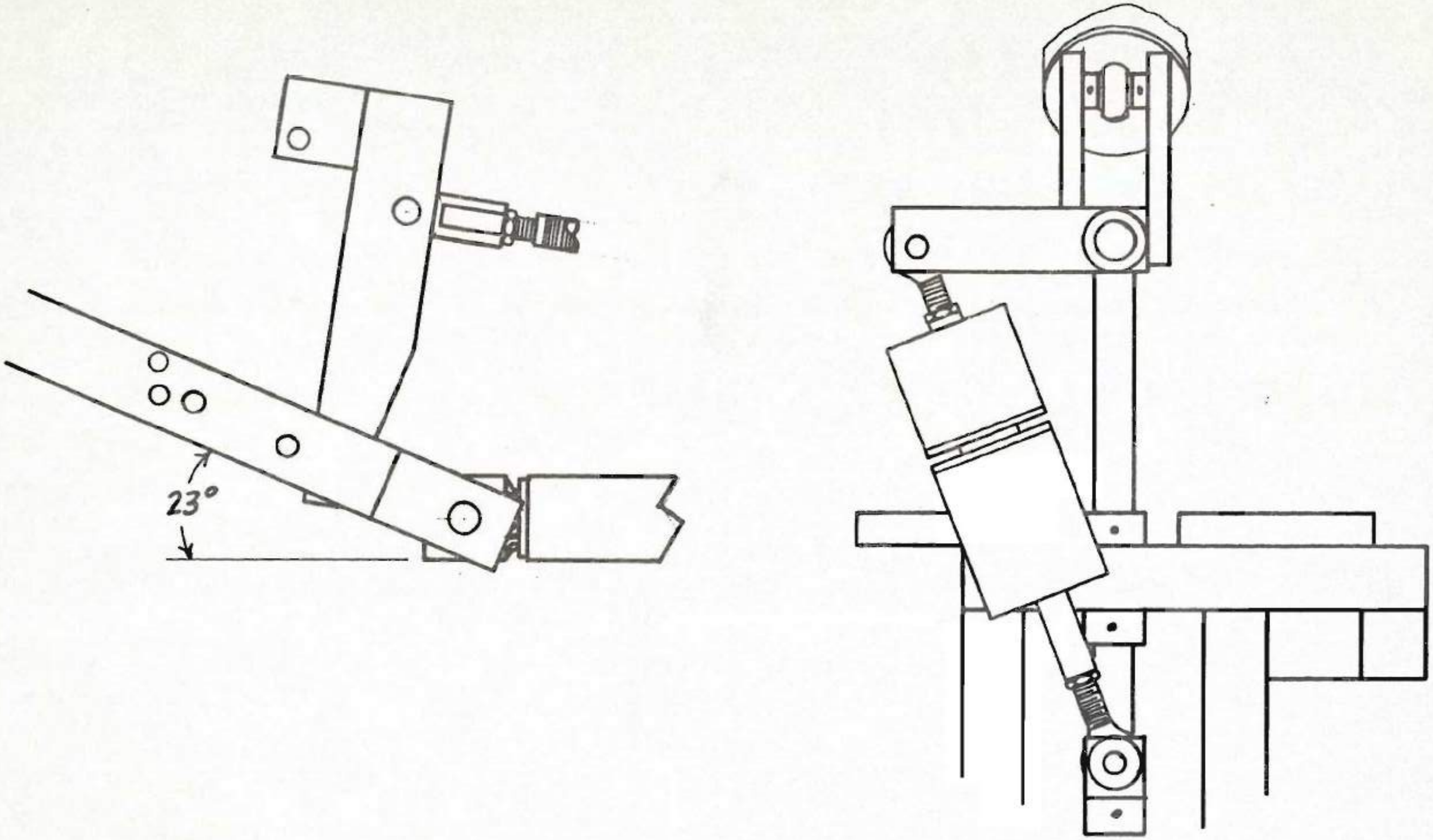
STOCK	MAT'L.

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REVISIONS	Q.C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS .010	SCALE: ———	DRAWN BY [initials]
REV. DATE BY			DATE 6·23·83	CHK'D BY
	ITEM: ADJUSTMENT OF HEAD LEFT, RIGHT CYLINDERS			~~UNTOLERANCED DIM. FRACTL. DECIMAL .030 .XX .010 .XXX .005~~
	MAT'L:			DRAWING NUMBER 3-110

STOCK	MAT'L.



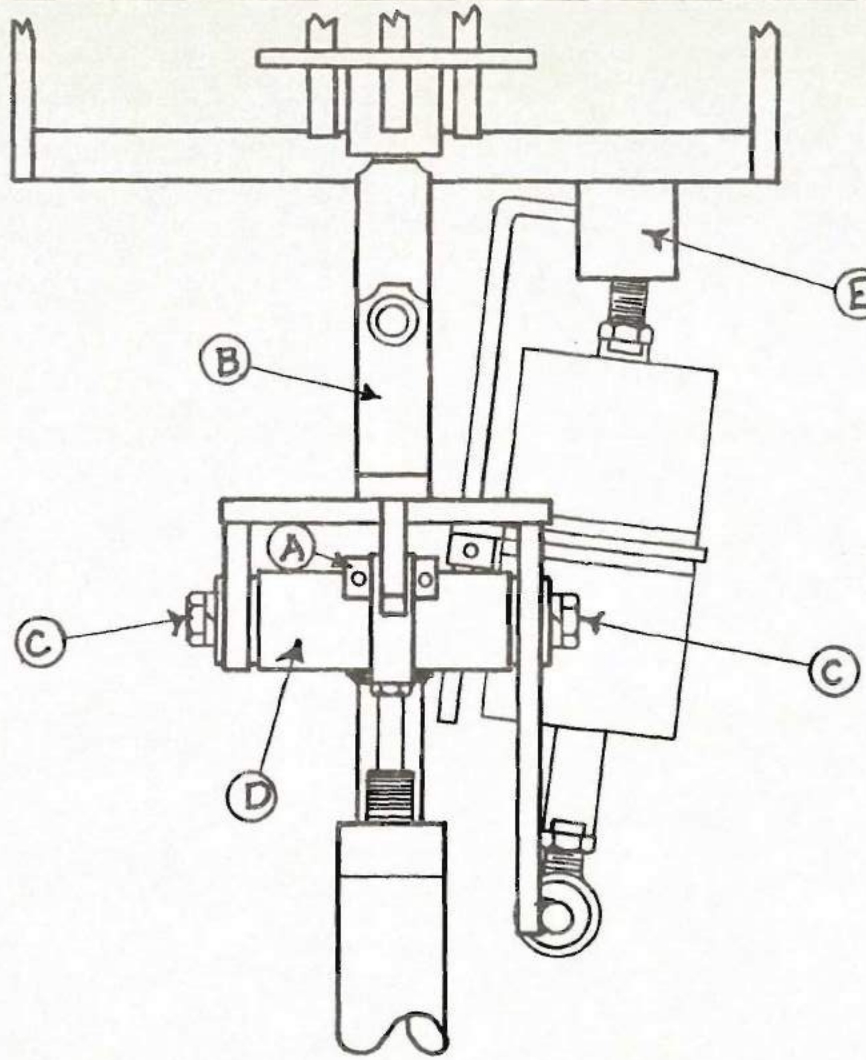
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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY	
REV. / DATE / BY			DATE: 6·23·83	CHK'D. BY	
	ITEM: SIDE VIEW OF HEAD AND UPPER NECK			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L:			DRAWING NUMBER 3-1[illegible]	



STOCK	MAT'L.

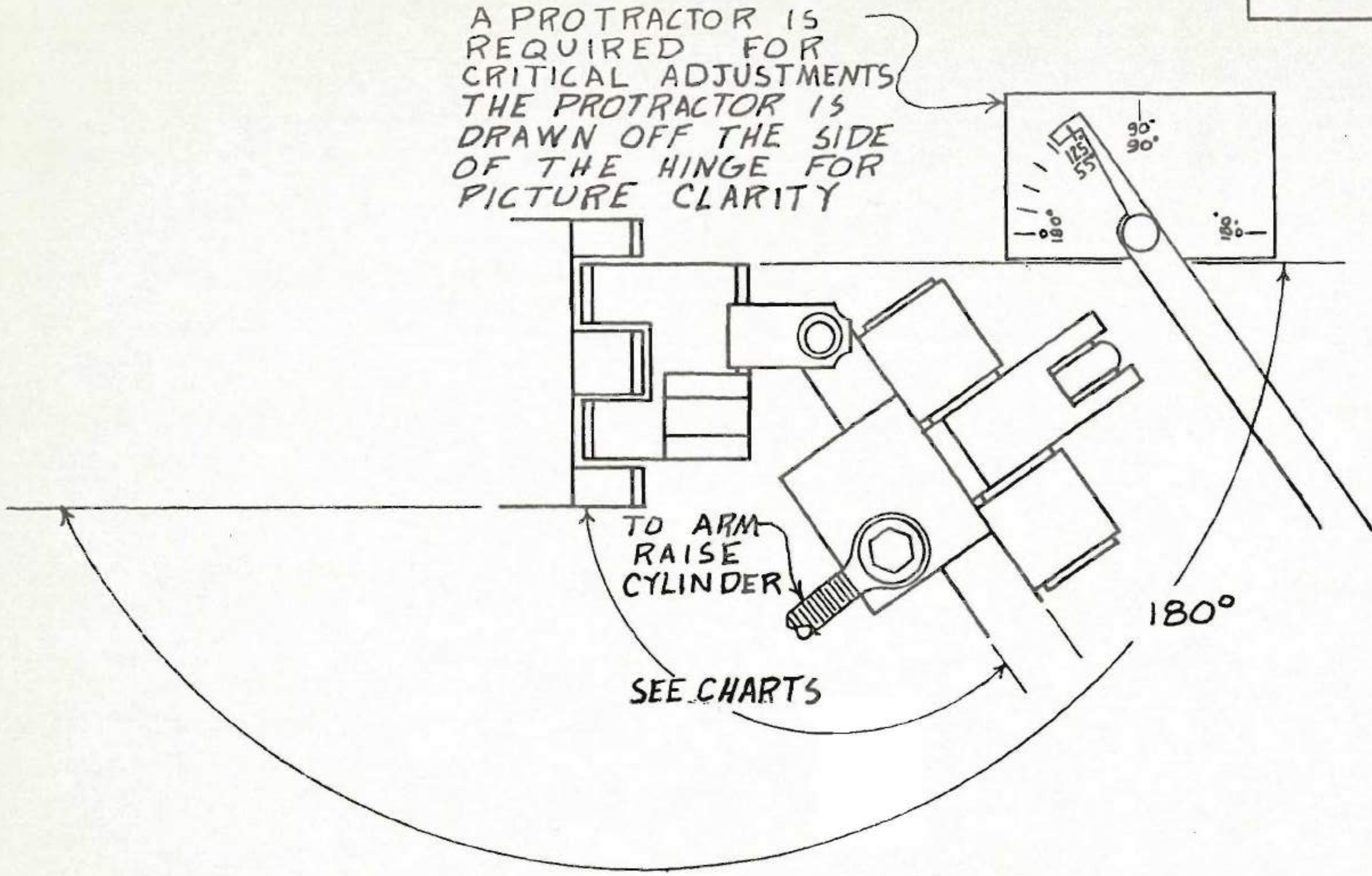
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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE: / DRAWN BY BD
REV. / DATE / BY		DATE: 10·11·83 / CHK'D. BY
	ITEM: BILLY BOB'S HEAD TILT, HEAD UP	UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:	DRAWING NUMBER 3-1

STOCK	MAT'L.



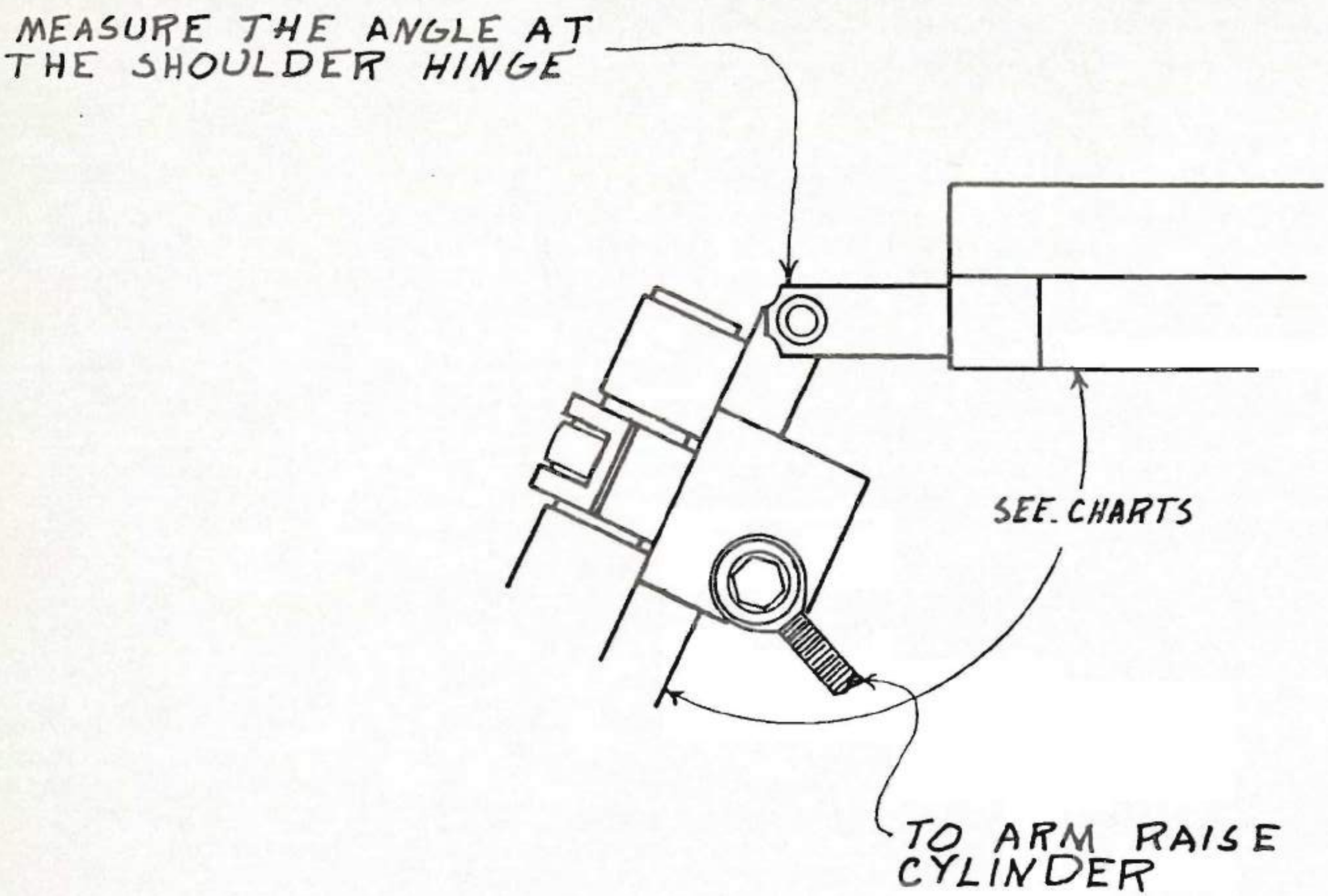
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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY BD
REV. | DATE | BY			DATE: 9·23·83	CHK'D. BY
	ITEM: FATZ HEAD TILT, UP			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-1

STOCK	MAT'L.



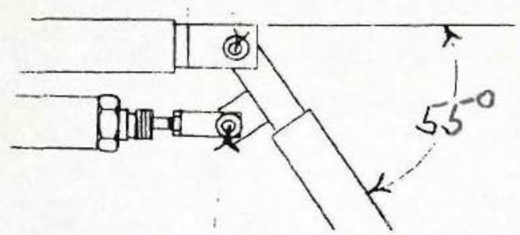
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	PRODUCTION APP. / DATE			
REVISIONS	Q. C. APPROVAL / DATE	DEBURR AND BREAK ALL SHARP CORNERS .010	SCALE: ——	DRAWN BY BD
REV. / DATE / BY			DATE: 6·23·83	CHK'D. BY
	ITEM: SIDE VIEW SHOWING ARM RAISE HINGE			~~UNTOLERANCED DIM. FRACT'L. DECIMAL .XX ± .010 ± .020 .XXX ± .005~~
	MAT'L:			DRAWING NUMBER 3-4

STOCK	MAT'L.



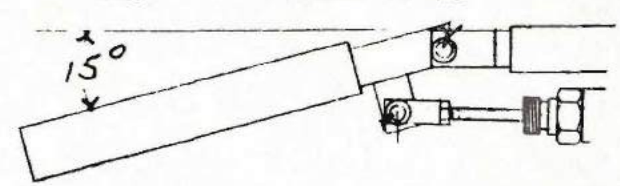
All tol. are Non-accumulative	R.+D. APPROVAL [signature]	DATE 7/83	CREATIVE ENGINEERING INC			Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited.
	PRODUCTION APP.	DATE				
REVISIONS	Q. C. APPROVAL	DATE	DEBURR AND BREAK ALL SHARP CORNERS .010	SCALE:	DRAWN BY BD	
REV. / DATE / BY				DATE: 6·27·83	CHK'D. BY	
	ITEM: SIDE VIEW RIGHT SHOULDER, ARM RAISE				~~UNTOLERANCED DIM. FRACT'L. DECIMAL .XX ± .010 .020 .XXX ± .005~~	
	MAT'L:				DRAWING NUMBER 3-5	

STOCK	MAT'L.

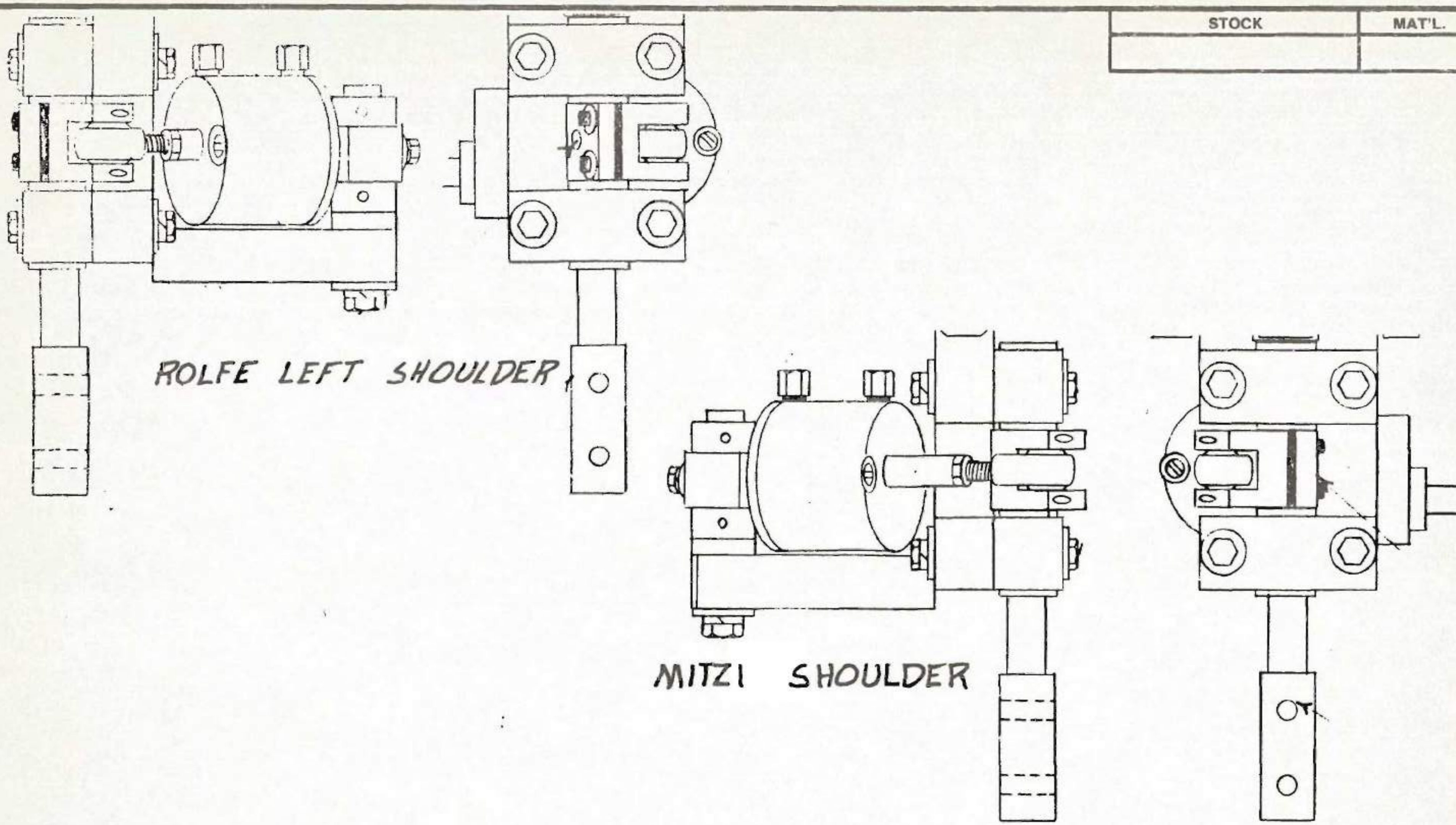


ROLFE ELBOW

MITZI ELBOW

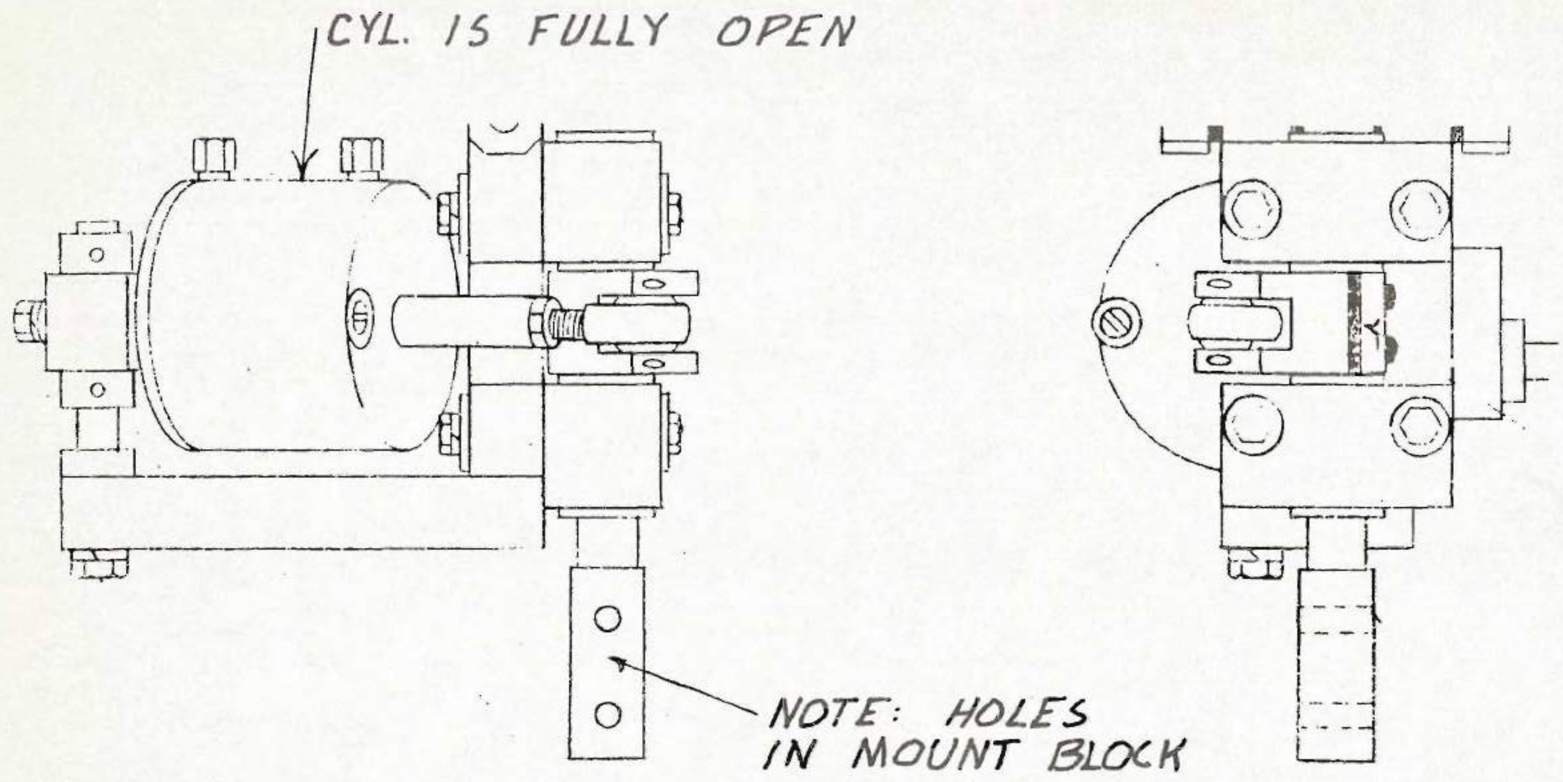


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REV. / DATE / BY		DATE: 10·18·83	CHK'D. BY
	ITEM: ELBOW, MITZI, ROLFE		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-[illegible]6



STOCK	MAT'L.

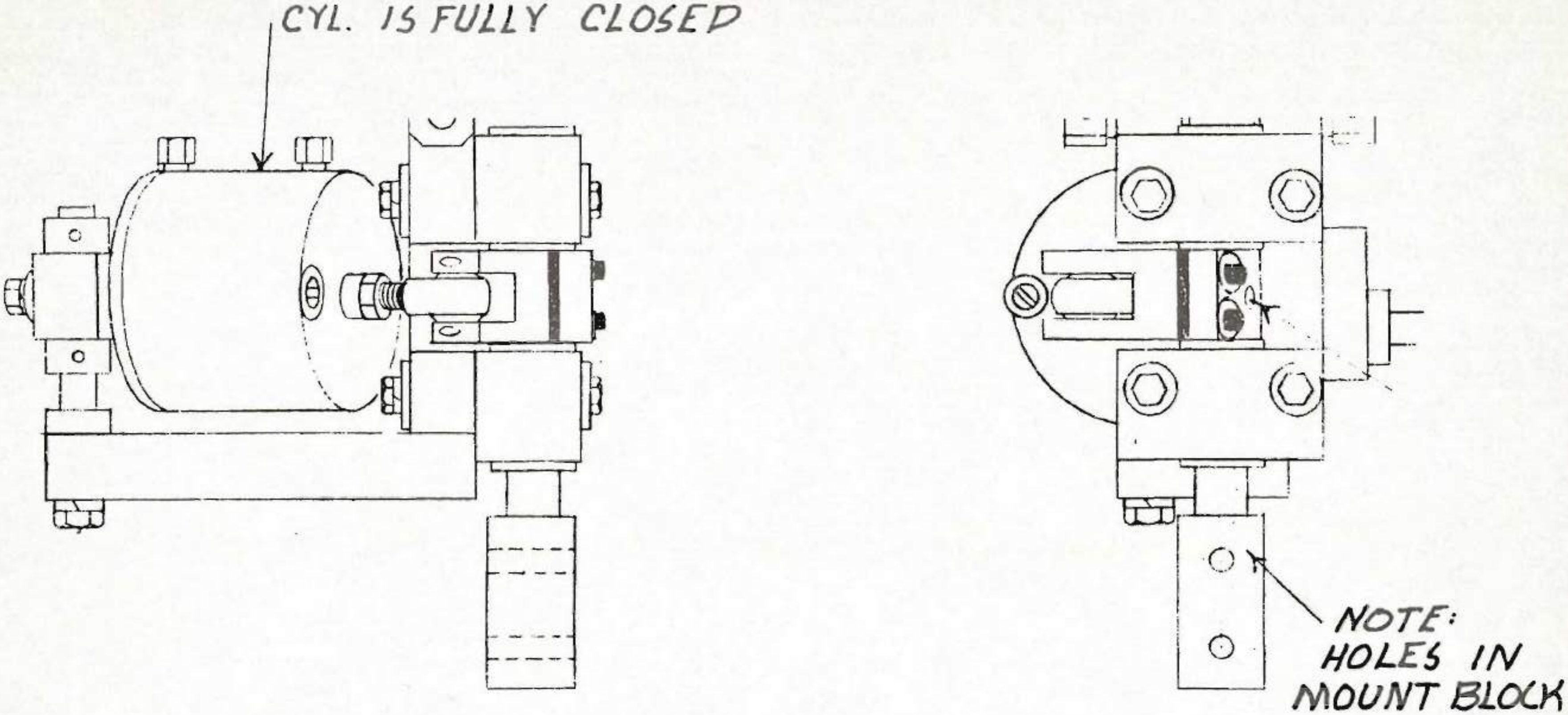
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	PRODUCTION APP. DATE		
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY BD
REV. | DATE | BY		DATE: 10·18·83	CHK'D. BY
	ITEM: SMALL SHOULDER TWIST		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L.		DRAWING NUMBER 3-(7



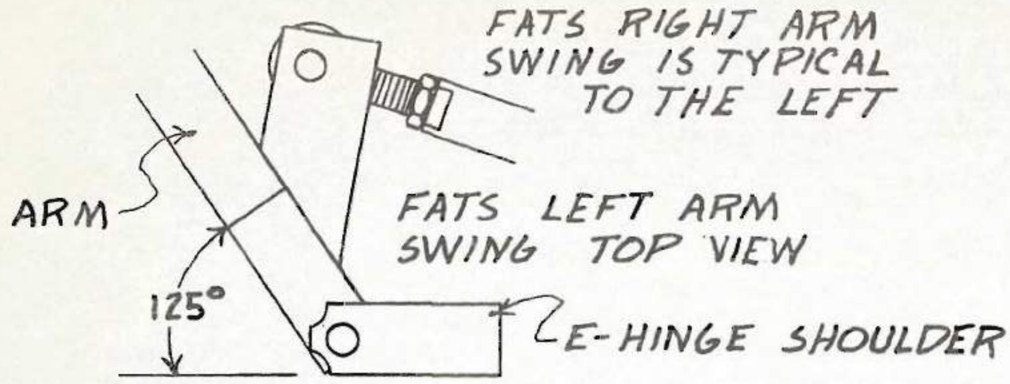
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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY ED
REV. DATE BY			DATE: 10·18·83	CHK'D. BY
	ITEM: BEACH BEAR, BILLY BOB SHOULDER			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-[illegible]3

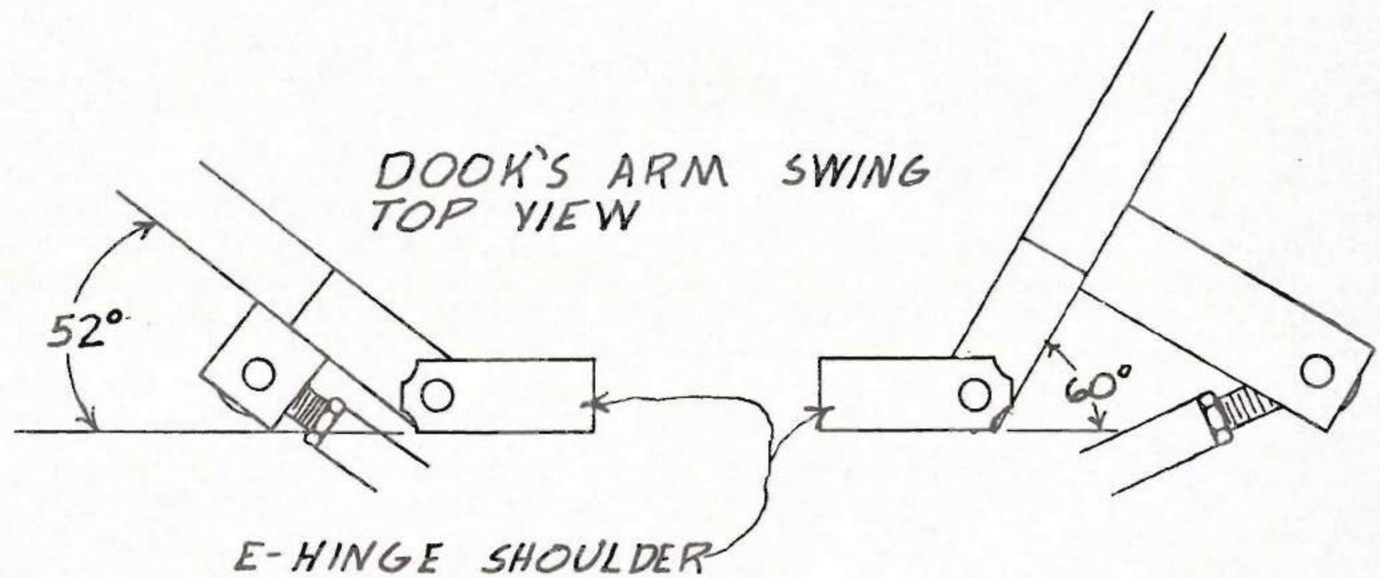
STOCK	MAT'L.

STOCK	MAT'L.



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REV. / DATE / BY			DATE: 10·18·83	CHK'D. BY
	ITEM: ROLFE'S LARGE SHOULDER			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-…

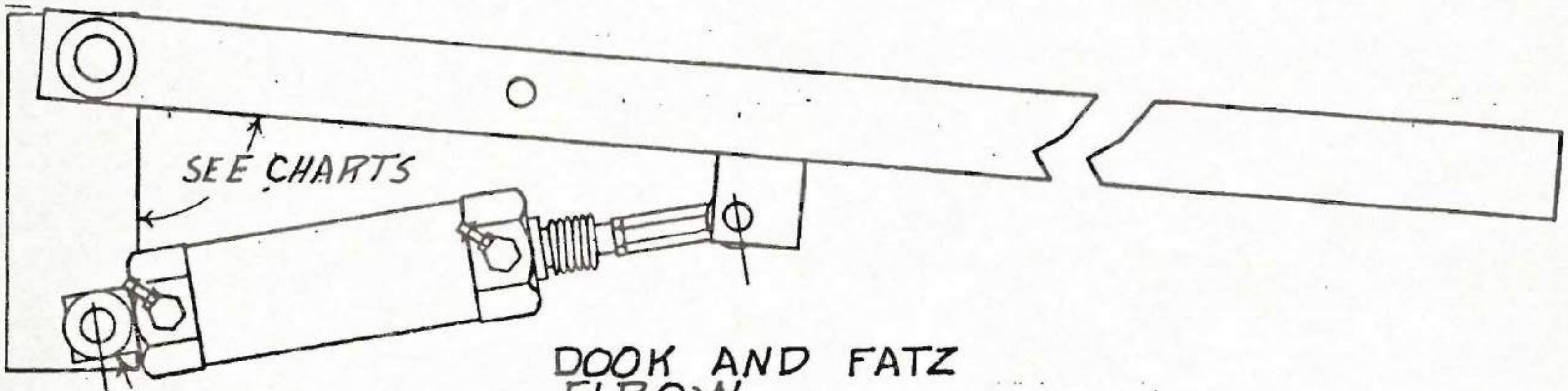




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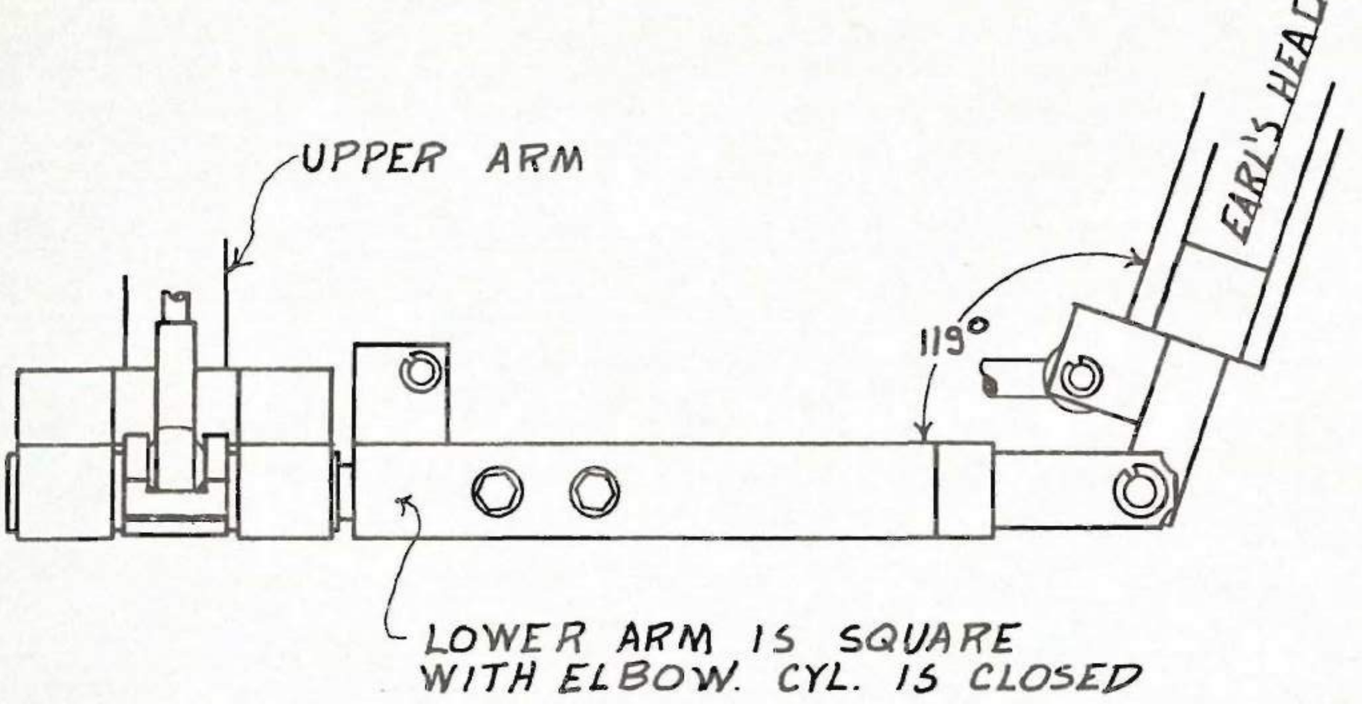
All tol. are Non-accumulative	R.+D. APPROVAL DATE	CREATIVE ENGINEERING INC	Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited.
	PRODUCTION APP. DATE		
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE:	DRAWN BY BD
REV. / DATE / BY		DATE: 10·18·83	CHK'D. BY
	ITEM: DOOK, FATZ ARM SWING		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-1[illegible]

STOCK	MAT'L.



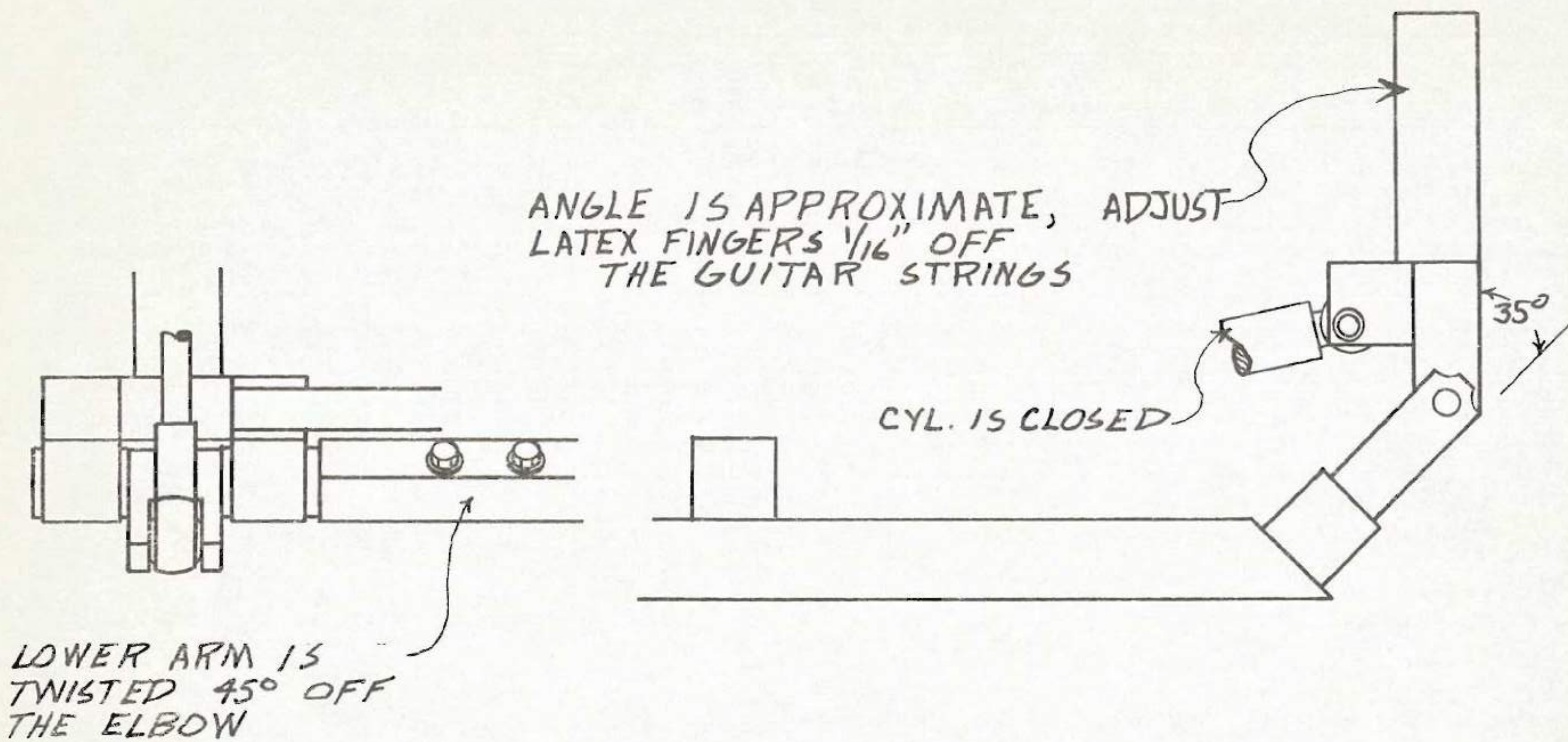
All tol. are Non-accumulative	R.+D. APPROVAL DATE	CREATIVE ENGINEERING INC	Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited.
	PRODUCTION APP. DATE		
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE: / DATE: 10·18·83	DRAWN BY [signature] / CHK'D. BY
REV. | DATE | BY	ITEM: ELBOW MOVEMENT		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-1

STOCK	MAT'L.



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	PRODUCTION APP. DATE				
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY BD	
REV. DATE BY			DATE: 10·20·83	CHK'D. BY	
	ITEM: ROLFE AND EARL'S ELBOW TWIST, HEAD TILT			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L:			DRAWING NUMBER 3-1	

STOCK | MAT'L.



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R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL DATE

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REVISIONS

REV.	DATE	BY

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 10-20-83

DRAWN BY [handwritten initials]

CHK'D. BY

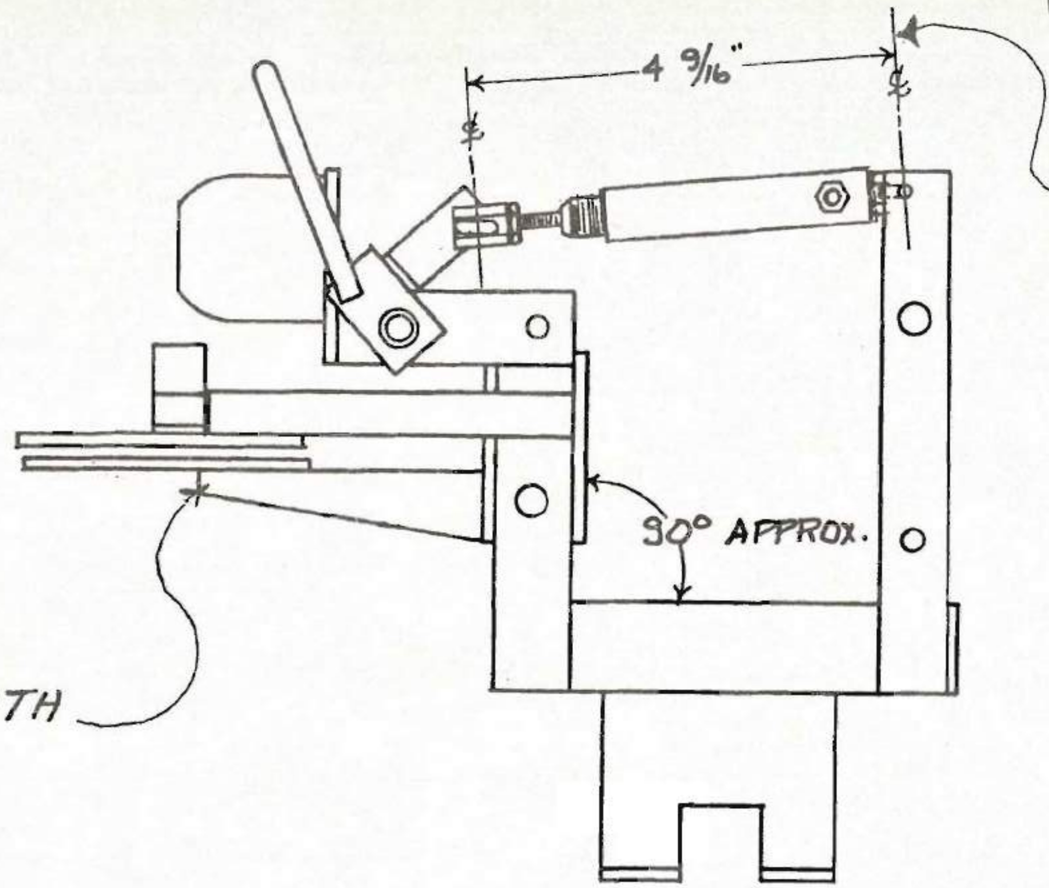
ITEM: GUITAR ARM TWIST AND WRIST BEND

UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .xx ± .010 .xxx ± .005

MAT'L:

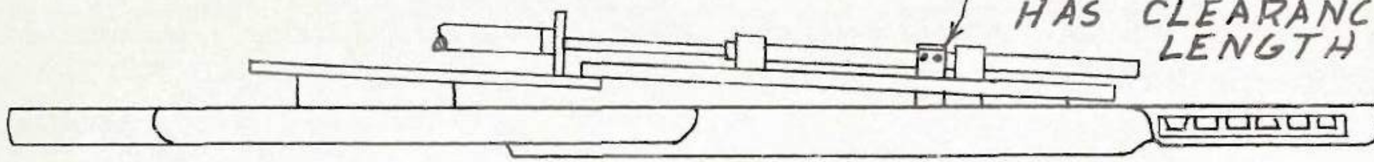
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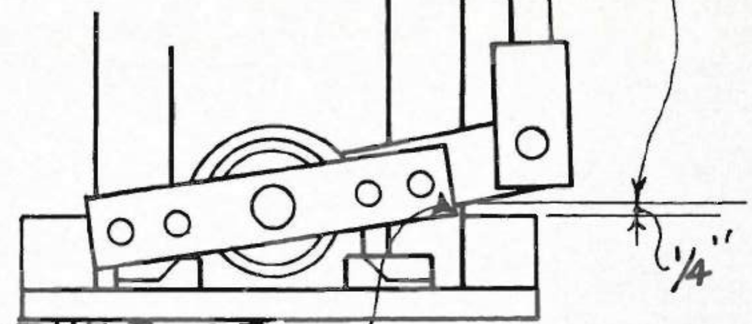
STOCK	MAT'L.



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	PRODUCTION APP. DATE			
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REV. / DATE / BY			DATE: 10·20·83	CHK'D. BY
	ITEM: EARL'S HEAD			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-12

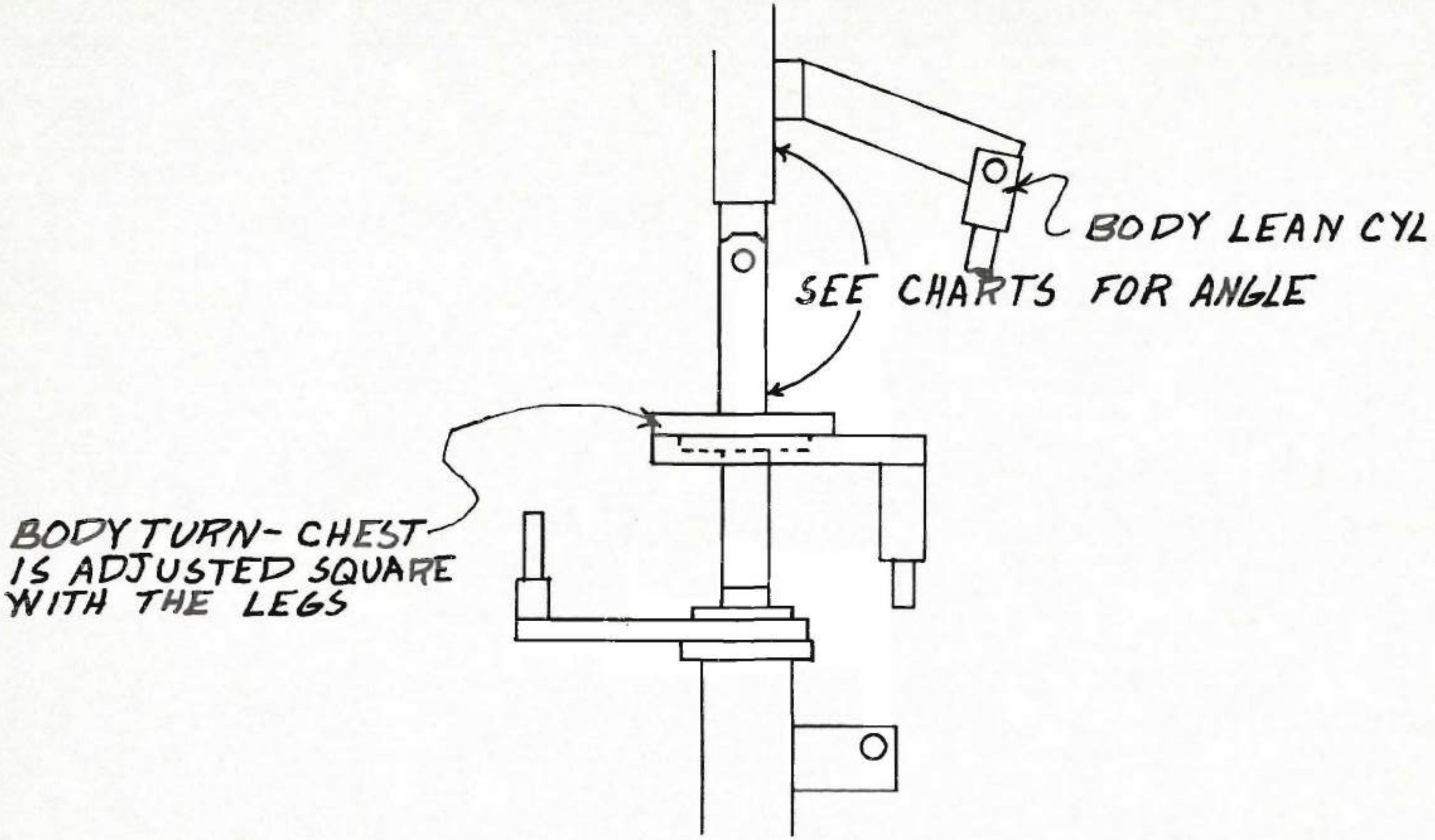
STOCK	MAT'L.





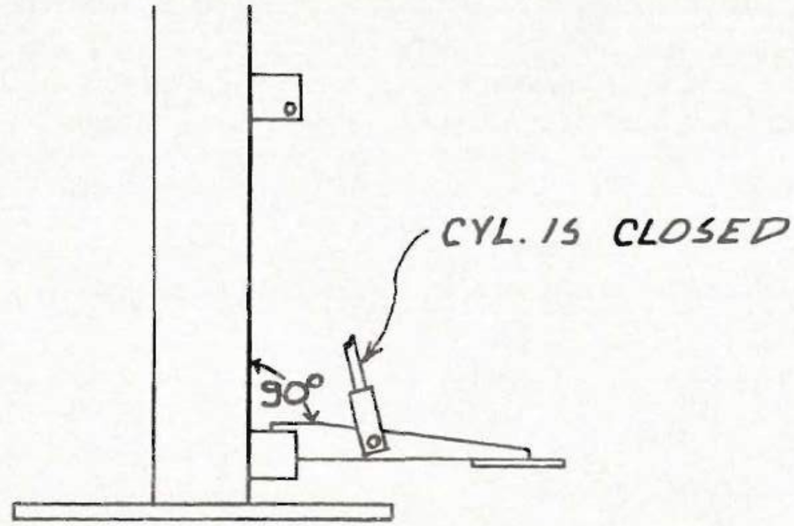
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	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY BD
REV. / DATE / BY			DATE: 10·20·83	CHK'D. BY
	ITEM: GUITAR MOVEMENTS			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-125

STOCK	MAT'L.



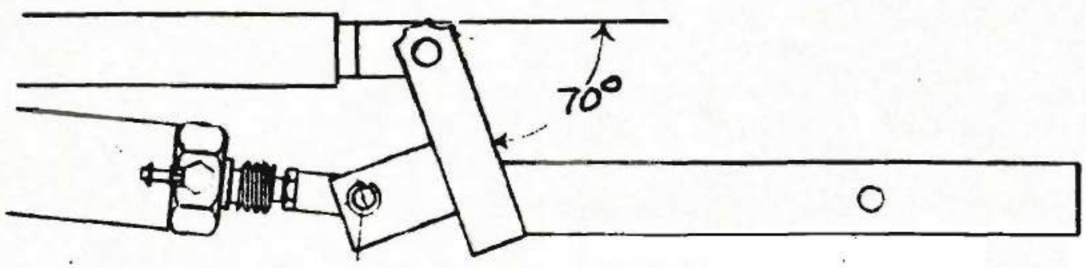
All tol. are Non-accumulative	R.+D. APPROVAL DATE	CREATIVE ENGINEERING INC		Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited.
	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY BD
REV. DATE BY			DATE: 10·20·83	CHK'D. BY
	ITEM: BODY TURN, LEAN			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-1[illegible]

STOCK	MAT'L.

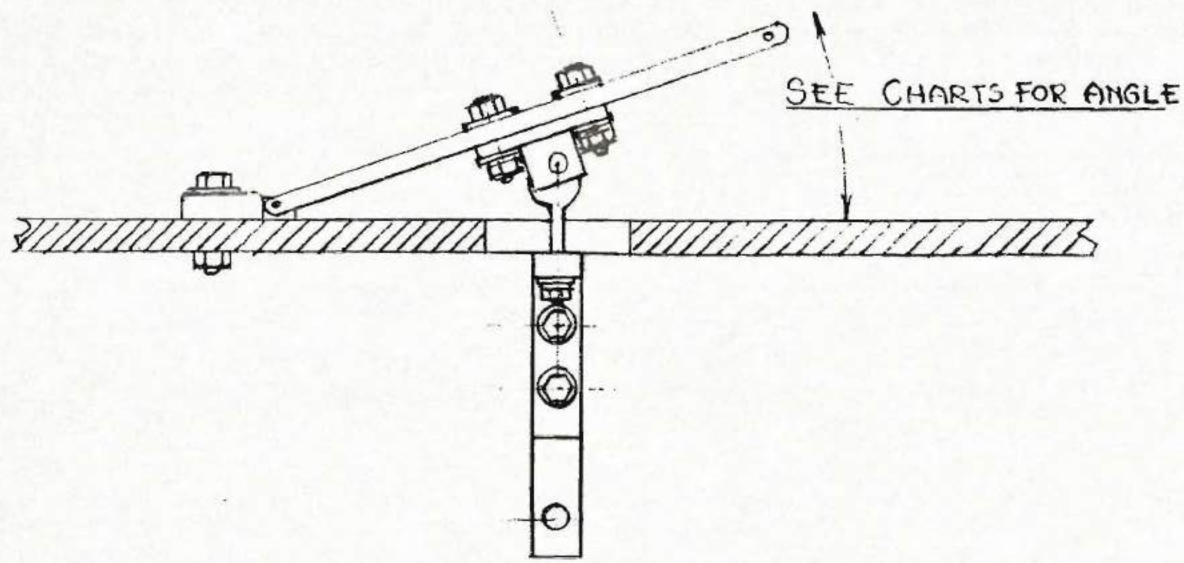


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REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY BD
REV. / DATE / BY			DATE: 10·20·83	CHK'D. BY
	ITEM: FOOT TAP			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-1

STOCK	MAT'L.

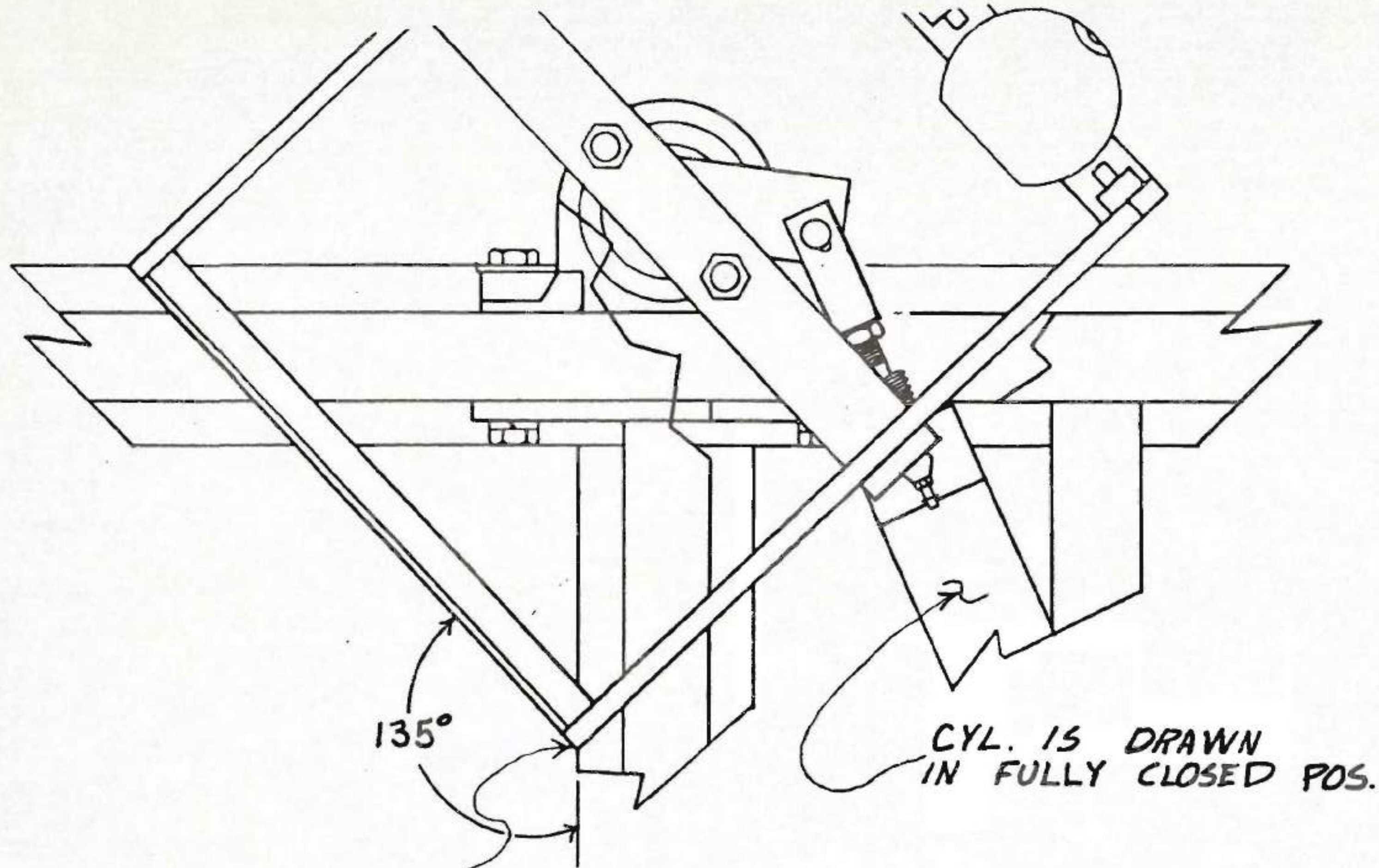


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	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY [illegible]
REV. | DATE | BY			DATE: 10·21·83	CHK'D. BY
	ITEM: BEACH BEAR LEG KICK			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3-1[illegible]



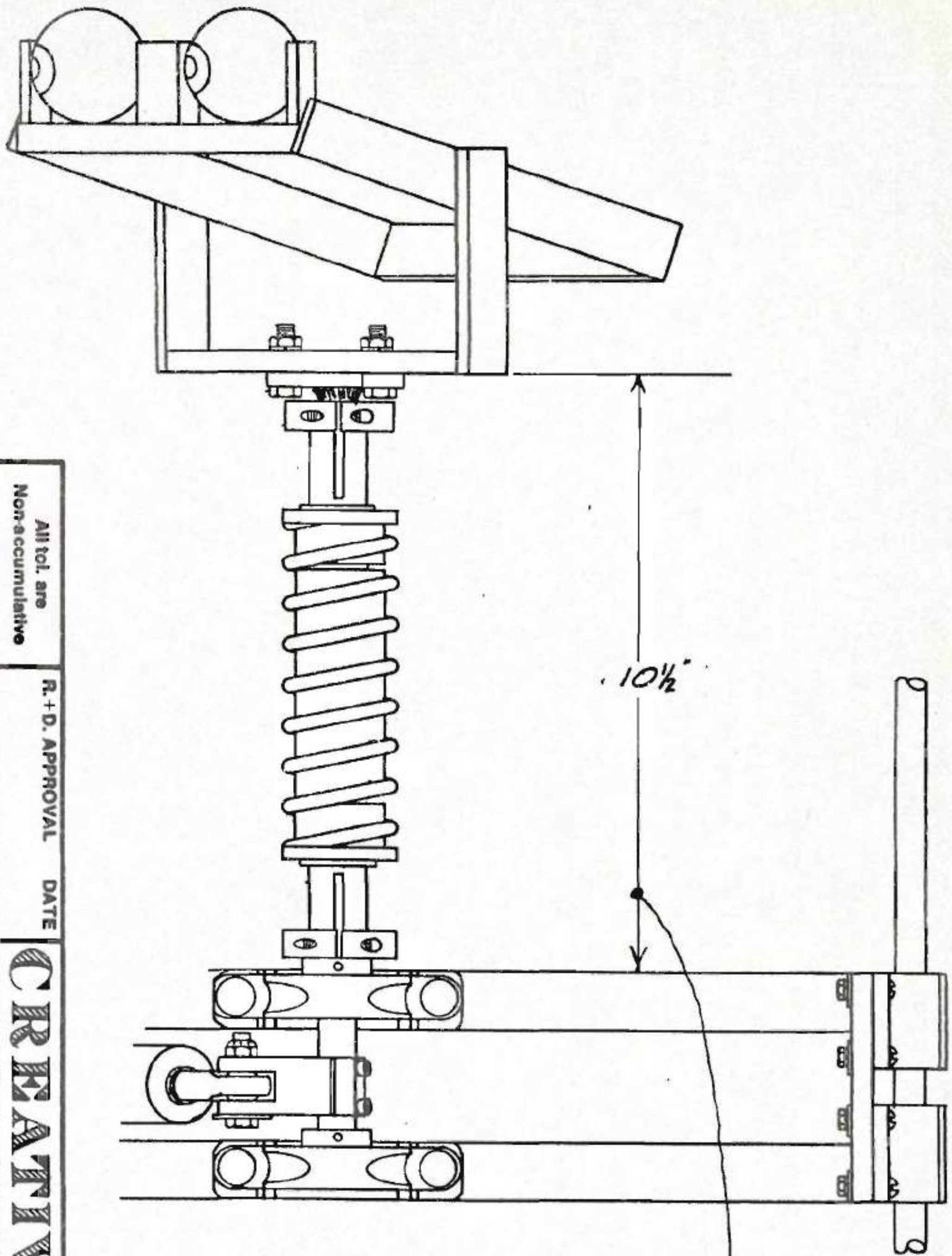
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	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE: 1/4" = 1"	DRAWN BY CR
REV. DATE BY			DATE: 10-21-83	CHK'D. BY
	ITEM: HIGH HAT & BASE DRUM MECH			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER 3[illegible]29

STOCK	MAT'L.



STOCK	MAT'L.

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REV. / DATE / BY	ITEM: LOONEY BIRD HEAD LEFT		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER 3-1[illegible]



NOTE: DIMENSION BETWEEN BOTTOM OF HEAD FRAME AND CARRIER BOX

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R.+D. APPROVAL DATE

PRODUCTION APP. DATE

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DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 10·21·83

DRAWN BY

CHK'D. BY

ITEM: LOONEY BIRD HEAD RAISE

MATL:

UNTOLERANCED DIM.

FRACT'L. ± .020

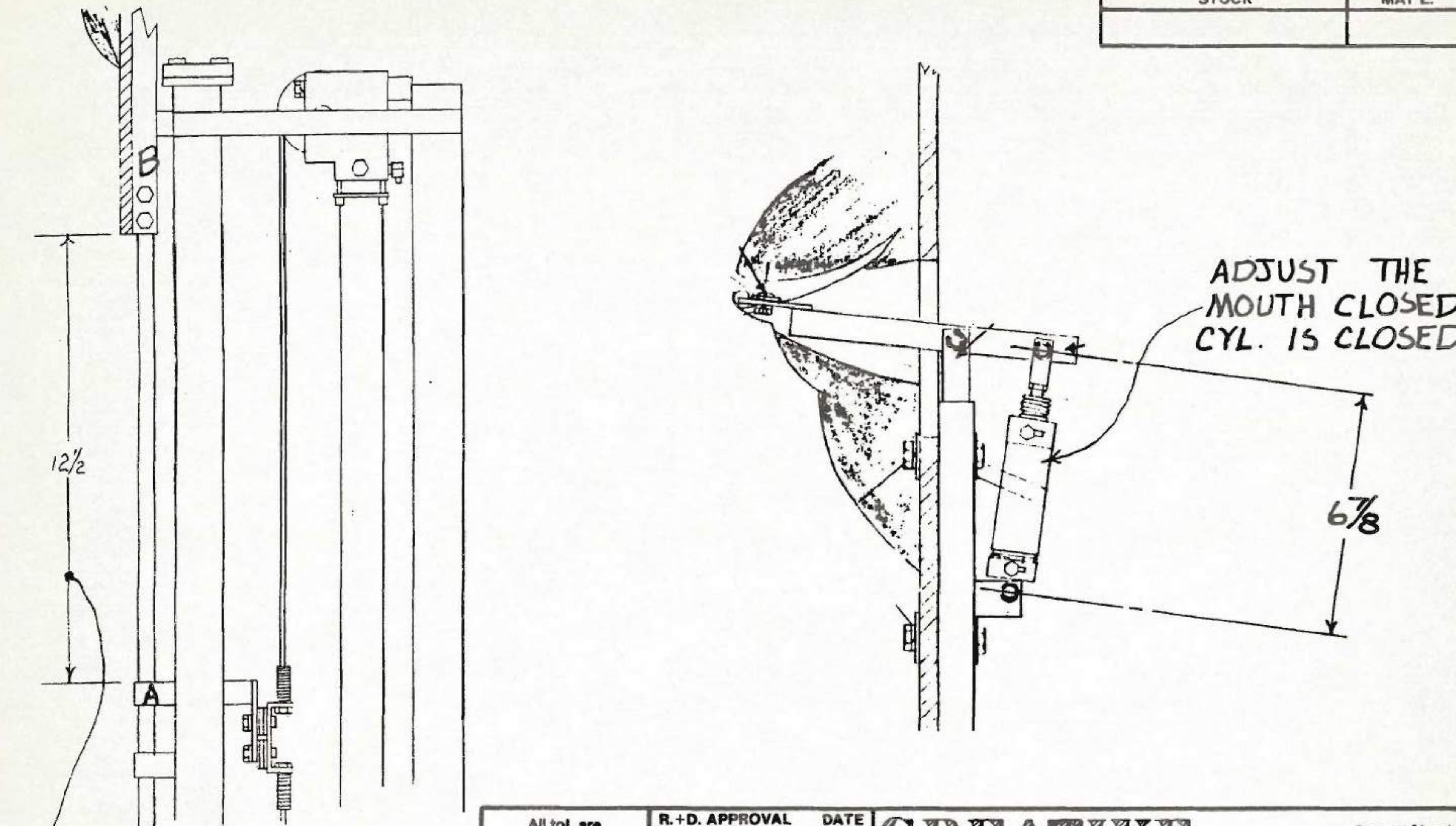
DECIMAL .XX ± .010 .XXX ± .005

DRAWING NUMBER 3-1

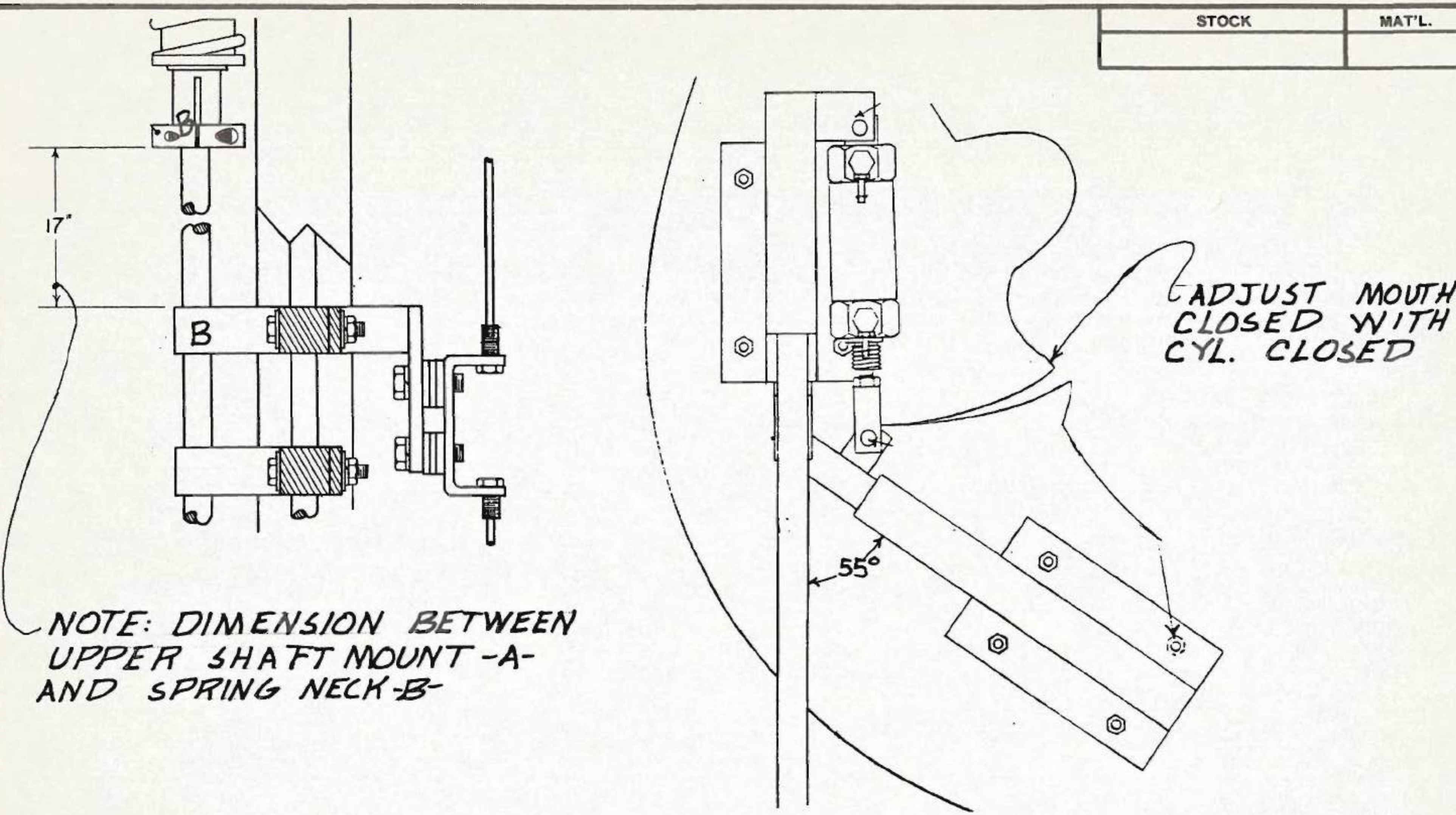
STOCK

MAT'L.

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REV. / DATE / BY			DATE: 10·21·83	CHK'D. BY	
	ITEM: SUN MOUTH SUN RAISE			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L:			DRAWING NUMBER 3-[illegible]2	



STOCK	MAT'L.

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SCALE:

DATE: 10-21-83

DRAWN BY [illegible]

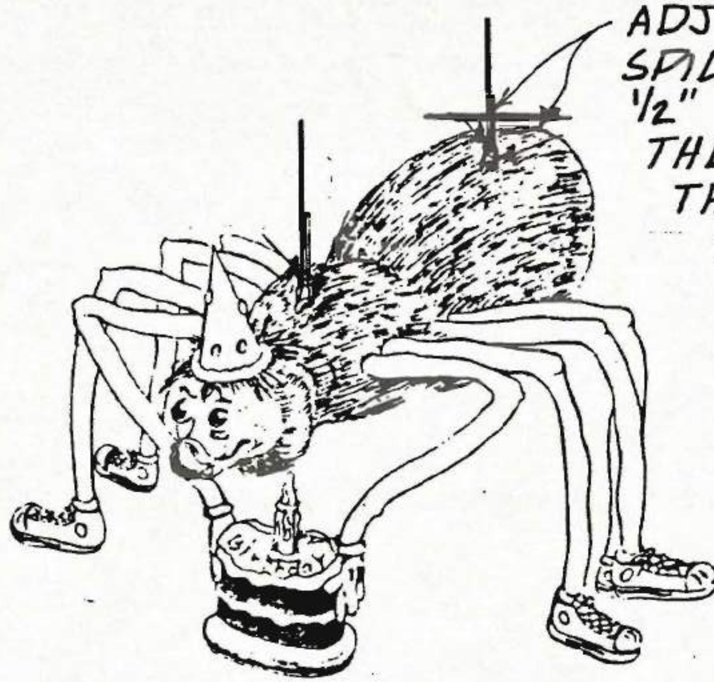
CHK'D. BY

ITEM: MOON MOUTH MOON RAISE

MAT'L:

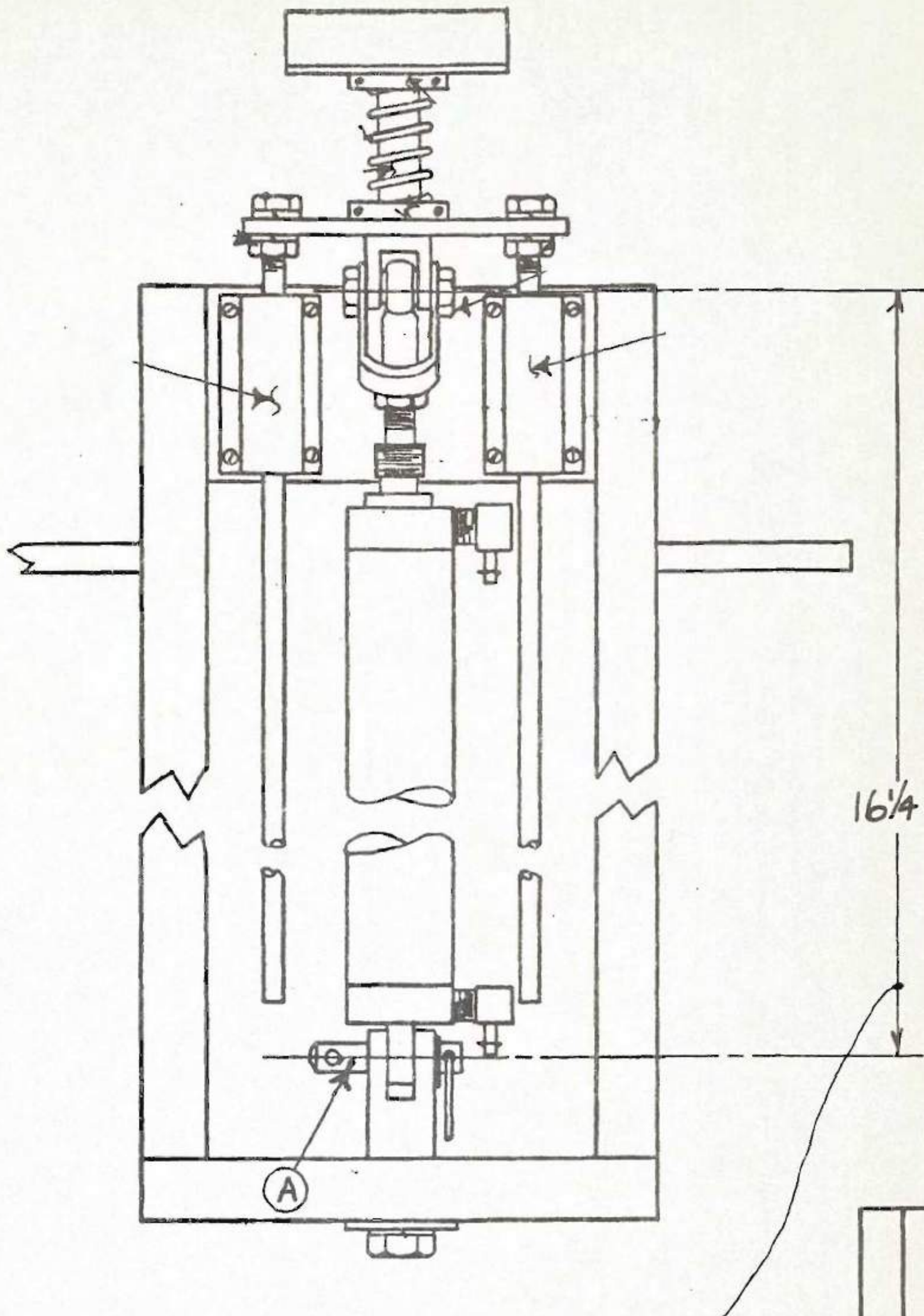
UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .xx ± .010 .xxx ± .005

DRAWING NUMBER 3-1[illegible]3



STOCK	MAT'L.

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REV. | DATE | BY			DATE: 10·21·83	CHK'D. BY
	ITEM: SPIDER			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .XX ± .010 .XXX ± .005
	MAT'L:			DRAWING NUMBER 3-134



All tol. are Non-accumulative

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REV.	DATE	BY

R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q.C. APPROVAL DATE

ITEM: BABY BEAR

MATL:

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DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 10·21·83

DRAWN BY BD

CHK'D. BY

UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .xx ± .010 .xxx ± .005

DRAWING NUMBER 3-135

STOCK

MAT'L.

SECTION III

COSMETICS

Description: The following text deals with the cosmetic appearance of the show. Each part of this section will contain drawings and instructions on how to make the necessary repairs. Some of the parts in this section will cover items that are common to more than one character, such as latex, or is special to one character. Most of the cosmetics used are very fragile and care must be used when performing maintenance any where on the platform.

Table of Contents

LATEX and FOAM

Description: The latex and foam parts are common to all characters in the form of body parts like Masks, Arms, Hands, Legs, Feet, Shoes and Dook's drum stand covering. These parts are made of liquid latex, or liquid foam poured into molds and cured. Then some are painted and or covered with fur, and attached with snaps or velcro. Maintenance is very important to these parts and should be part of the characters weekly P.M.

1. R & R, Removal and Replacement of latex or foam parts:
   a) If snaps are used, locate all of them before you attempt to remove the part. DO NOT rip the snaps apart, as you can put an undue strain on the latex or foam and tear it or pull the snaps from the part. If a snap is stubborn, a small screw driver should be used between the male and female portions of the snap to gently pry them apart. If a snap is pulled out (SEE SNAPS and Velcro) Page 3-143 and 3-144.
   b) If velcro is used, separate the two parts slowly so as not to put any strain on the part. If the velcro is pulled from the part(SEE SNAPS and VELCRO) Page 3-143 and 3-144.
   c) To replace the latex or foam parts it is important that you pay close attention to the placement and positioning. With these parts in place there should be no distortion and you should be able to move the character in any direction with out straining any of the latex or foam to pull it out of shape.

2. Cleaning latex parts:
   Use a clean cloth, dampened with warm water. <u>NO OTHER</u> type of cleaner should be used, as it will break down the latex and damage it. DO NOT get the fur on any latex parts wet. If the fur is soiled the cleaning problem is much more serious, as any spot remover, would be useful, but is hard to control. Use a <u>Cream Spot Remover ONLY</u>, to clean a soiled area of fur on any latex or foam part.
   <u>CAUTION CREAM SPOT REMOVER WILL DAMAGE THE LATEX OR FOAM.</u>

Also SEE Costume and Fur page 3-139 and 3-140.

3. Problems and Repair:
   a) SNAPS or VELCRO: that is pulled from the latex or foam , damaged or won't hold tight, SEE Snaps and Velcro page 3-143 and 3-144.
   b) LATEX WEAR: A wear spot is evident by; paint worn off, and gummy areas in the latex, the cause should be corrected immediately. If the gummy area is in the inside of the latex, use an application of talcum powder. If the gummy area is on the out side of the latex, like the mask eye sockets, use the eye lube sparingly, (Part # APK 1301). The talcum powder and eye lube will help to reduce friction, but are not a permanent fix, only to buy time until a replacement latex part is obtained.

c) RIPS in the latex: The cause of the latex ripping needs to be located and corrected immediately.
Rips can be repaired by using 3M CA-40 Glue. It is important that the ripped sections be lined up exactly. Once the pieces are pushed together it will be to late to make any corrections. Take precautions CA-40 will damage the fur and paint on the latex parts. This procedure is not a permanent repair, but allows time for a replacement part to be obtained.

d) TONGUES, FINGER and TOE NAILS that have fallen off, can be reglued with hot melt glue. Follow the same precautions as above in step c. If any are lost or damage beyond repair, they can be ordered from your parts catalog.

e) LATEX PAINTED, Parts that have worn areas, paint peeling off, scratched, can be touched up using cotton swabs. Under NO circumstances are large areas to be brushed painted. If an artist is available, airbrushing the part would yield the best results. The touch up paints can be ordered from your parts catalog. There you will find the color you need, the part number of the paint and where the paint is to be used.

f) FOAM, that has separated from itself, or has been damaged, torn or pulled apart from latex, or any attaching devises, can be repaired with 3M Weather Striping Cement Part # 95-010-030. Take precautions cement will be very difficult to remove from fur or any painted parts.

COSTUME AND FUR

DESCRIPTION: The costume and fur parts are common to all characters in the form of coverings for Mask, Arms, Hands, Body, Legs, Feet etc. and are generally made of polyester fibers, with the exception of Wigs which are made of P.V.C. Fibers. The costume material or fur is cut into patterns, sewn or hot glued into parts that are attached to the characters by either snaps or velcro.

Maintanence is very important to the costumes and fur and should be part of your P.M. procedures.

1. R&R- Removal and Replacement:
   a) Removal with snaps: Locate where all the snaps are before you attempt to remove the costume or fur part. DO NOT rip the snaps apart, because you can tear or pull the snaps from the costume or fur parts . If a snap is stubborn, a small screw driver can be used to pry the male and female portions of the snap apart. If a snap is pulled out SEE SNAPS and VELCRO page 3-143 and 3-144.
   b) Removal with velcro: Separate the two parts slowly, DO NOT rip the velcro apart, because you can rip or tear the velcro from the part or tear the part itself. If the velcro is pulled off the part SEE SNAPS and VELCRO page 3-143 and 3-144.

2. Installing Costume or Fur:
   It is important that you pay close attention to the positioning and placement of the costume or fur. With the costume or fur in place, you should be able to move the character in any direction with out straining any of the seams, restricting or binding any movements or rubbing the costume or fur parts together. If any of these problems exist. See Problems and Repair Below. For detailed instructions on character dress. See pages 3-149 thru 154.

3. CLEANING:
   a) Dry Cleaning is the only method used, although there are some exceptions. One is DOOKS Silver Lame Vest, it has the D emblem stitch to it. The emblem has to come off before dry cleaning the vest. Cut the stitching to free the emblem, taking care not to cut the vest material or the emblem and denote the position the emblem is on the vest. Re-attach the emblem to the vest in the same position as before. NOTE: Some dry cleaners will remove and re-attach the emblem if arrangement can be worked out. This is entirely up to you and the cleaners.
   The other exception is where the costume or fur is attached to latex or foam. To clean use a <u>SPOT CREAM REMOVER ONLY</u>, as any other cleaner would be useful but is hard to control.
   <u>CAUTION CREAM SPOT REMOVER WILL DAMAGE LATEX OR FOAM</u>

******** AN IMPORTANT NOTE: FIRE PROOFING and FIRE CODES ********

Some areas have strict fire codes, some areas are not as strict. After Dry Cleaning any item, it will be necessary to re-treat and re-certify to the fire proofing codes in your area.

4. GROOMING:
   a) A short blast of air and light brushing is all that is needed except when the fur is knotted or matted. Use a wire wig brush on these areas only and not as a normal grooming brush. Take care not to scratch any painted parts when using the wire wig brush.

5. PROBLEMS and REPAIRS:
   NOTE: When ordering fur parts or fur for repairs. Refer to the Rock-A-Fire parts catalog listing under each character or in the character supply section. And remember to state the date your store opened, when you place an order.
   a) Fur Sewing Repairs: Fur that has worn off, torn or has a hole in it. To repair the damaged area, first trim away the fabric at the area to be repaired. Next cut a piece of fur a little bit larger than the area to be repaired. Stitch the patch of fur to the inside of the fur part being repaired, and pull the fur piles through to cover the repaired area. Brush the repaired area lightly to blend the fur. If the problem seems to be happening constantly, see step B below.
   b) Fur Hot Glue repairs: Fur that has a problem constantly, needs to be examined closely and corrected, by referring to the repair section of either Mechanics pages 3-032 thru 3-093 or Inner Body Parts, pages 3-141 thru 3-142.
   Once the problem has been corrected, you can repair the fur as detailed in step (a) above. To help keep this type of problem from recurring, you can reinforce the repaired fur area, by hot gluing a piece of cloth-back vinyl to the back side of the fur. Use the hot glue sparingly, apply the glue to the vinyl and press it to the back of the fur. If to much glue is used it will soak through the fur backing to the fur and matt it. CAUTION the hot glue gun tip will melt the fur.
   c) Fur To Latex Repairs: Hot glue is the best method used for this type of repair. Apply the hot glue to the latex and press the fur in place. Use the glue sparingly as to much will soak through the fur backing to the fur and matt it. Caution: the hot glue gun tip will melt the fur. When using the hot glue you can get glue strings on the fur.The glue strings can be brushed out with a brush.

INNER BODY PARTS

Description: Inner body parts are design to do different functions for each character through out the show. These parts are made from different types of materials that are suitable for their particular function.

These materials are fiberglass, duct hose, leather and cloth backed vinyl.

The fiberglass parts are designed to give a particular shape, i.e. character head and body parts, and some are used as props. The body and head skulls parts are attached to the characters frame with threaded rods, nut, flat washers and lock washers. Once attached to the frame the fiberglass parts are held in a proper configuration related to each character's shape.

Costume pieces are then attached to the fiberglass by means of snaps, which give each character it's final appearance.

Leather, duct hose and vinyl are know as protective coverings and have a twofold purpose; one, they keep costumes out of the mechanism, two they help maintain the shape and definition of the characters.

The leather is used mostly on shoulder, elbows and hips, and are attached with snaps. Some of the older characters may have vinyl instead of leather.

The duct hose is used on the arms, and is attached with threaded rod.

Maintenance is very important to the inner body parts and should be part of your characters weekly P.M.

1. R & R, Remove and Replace Inner Body Parts:
   A. Fiberglass and Duct Hose:
      a) To remove fiberglass, it is necessary to mark or note the exact position before removal. The threaded rod which holds the fiberglass in place should not be tampered with, if at all possible. If the rod has to be removed it is necessary that the exact location of the nuts be marked on rod, to insure that the threaded rod and fiberglass are replaced back on the character, in the exact location for proper alignment. See fiberglass placement prints page 3-155 thru 3-186.
      b) To remove the duct hose, use the same procedures as stated for fiberglass, except, it is recommended that the duct hose be moved up or down the arm as opposed to removing the hose all together.
   B. LEATHER OR VINYL:
      a) These parts are attached with snaps. Locate where are all the snaps are before you attempt to remove the part. DO NOT rip the snaps apart, you can pull the snaps from the part or tear the part. If a snap is stubborn, a small screw driver can be used to pry the male and female portions of the snaps apart. If a snap is pulled out See Snaps and Velcro page 3-143 and 3-144.

b) To replace the leather or vinyl, it is important that the positioning be paid close attention to. With the leather or vinyl in place you should be able to move the character in any direction with out straining any seams, restricting, or binding any movement.

2. CLEANING INNER BODY PARTS:
Cleaning inner body parts should be part of your characters weekly P.M. All that is necessary to clean fiberglass is to keep any oils or other substances off the fiberglass that will damage the costume.
To clean the leather or vinyl use a damp cloth, the leather how ever should be cleaned with saddle soap. These details are listed in your P.M. part of this manual.

3. PROBLEMS AND REPAIRS:
A. FIBERGLASS: If any snaps are pulled from the fiberglass See Snaps and Velcro pages 3-143 thru 3-144.
a) Fiberglass that is cracked or has a piece broken off, or the mounting holes elonglated, can be repaired. It is recommended that a repair kit be purchased locally, and the instruction included be followed. Always patch the fiberglass on the inside, if at all possible.
b) Improper body or head skull placement can be caused by bent threaded rods, loose nuts either at the frame or the fiberglass. If any costume damage is caused by fiberglass placement, re-position the fiberglass using all the nuts, lock washers and flat washers, and do not drag or push the fiberglass against the threaded rod, it will elongate the mounting holes making the re-positioning difficult.
For costume repair see pages 3-139 and 3-140, and fiberglass placement, pages 3-155 thru 3-186.
B. DUCT HOSE: The duct hose repairs will mostly be rips in the fabric which make up the body of the hose. Duct tape is the quickest fix for this, however, using the tape extensively will coat most everything with adhesive and make a mess of the costume parts. If large scale repair is necessary, it is recommended to purchase the hose locally. When replacing the duct hose with a piece you fabricated yourself, trim and bend back the wire and cover the exposed ends with a strip of cloth backed vinyl which is hot glued on. This will protect the fur or costume.
C. LEATHER OR VINYL: The leather and vinyl pieces are attached with snaps. If any snaps are pulled out See Snaps and Velcro pages 3-143 and 3-144.
a) If any vinyl pieces are worn out, they should be replaced with the updated leather version.
b) Holes in the leather or vinyl can be repaired by hot gluing a patch on the out side, over the hole. This is not a permanent fix, and only serves to buy time until a replacement part is obtained. If the replacement part snaps do not line up with snaps in the fiberglass, relocate the snaps in the fiberglass not in the leather.

SNAPS AND VELCRO

DESCRIPTION: Snaps and Velcro (attaching devices) are used extensively through out the the show. They attach costumes, latex, vinyl, leather and fur parts to each character. There is very little maintenance to do on the snaps or velcro, except when the snaps or velcro get pulled away from a part or become damaged.

The snap has two parts, male and female. The male part consist of a stud and post, and the female part consist of a socket and cap.

Velcro has two parts, male and female. The male part, called the hook and the female part, called the loop.

1. PROBLEMS AND REPAIR:

A. SNAPS:

a) Snaps pulled from latex, foam or vinyl.
Snaps being replaced on latex, foam or vinyl, need to be reinforced with a 3/4" X 3/4" piece of cloth backed vinyl. Punch a 1/8 O. D. hole in the center of the vinyl square. Place the vinyl on the inside of the latex, foam or vinyl part. Line up the vinyl square and the parts for either male or female snap, to the original hole of the old snap. And secure with a snap tool. See drawing on the next page.

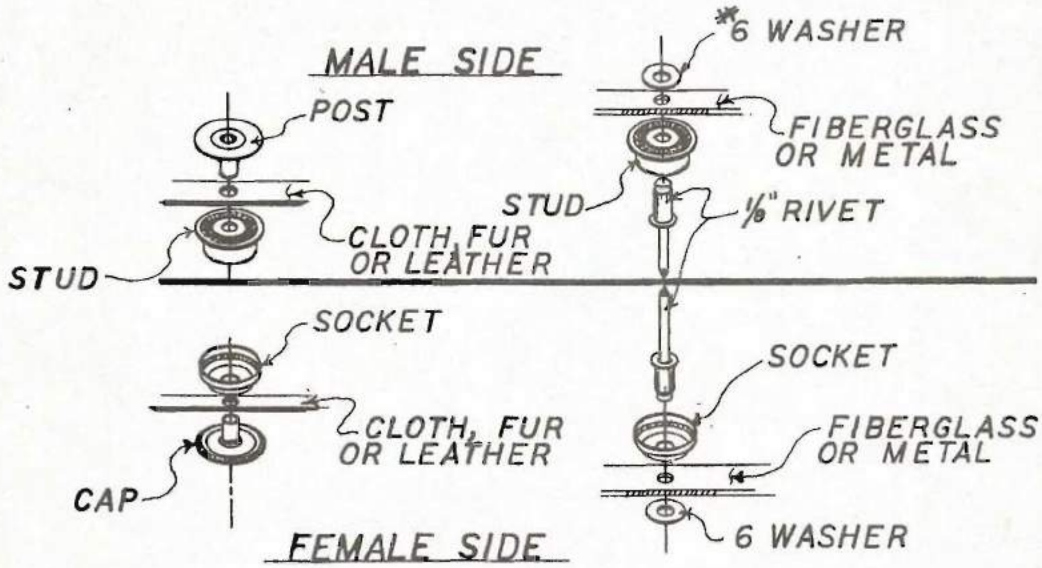
b) Snaps pulled from the costume or fur.
Replacement snaps on the costume or fur, need to be reinforced with a 3/4" X 3/4" piece of cloth backed vinyl. Line up the vinyl square to the area being repaired on the inside of the costume or fur. Apply hot glue sparingly to the cloth side of the vinyl, and press it to the area being repaired. Punch a 1/8" hole in the vinyl, using the hole in costume or fur as a guide. With the parts for either a male or female snap, secure to the costume or fur. Glue a small circle of matching fur, of the part being repaired, to cover any part of the snap that shows.

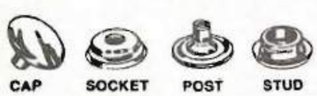
c) Snaps pulled from leather.
Replacement snaps in leather are generally nothing more than replacing the snap. Leather is to tough to get torn, or have the snap rip out causing a larger hole.

d) Snaps pulled from fiberglass or aluminum.
Replacement snaps in fiberglass or aluminum are generally nothing more than replacing the snap, unless the fiberglass or aluminum has been repaired. To install snaps you will need only the stud part or socket part of the snap, a 1/8" rivet, #10 nut and rivet gun. Slip the rivet through the stud or socket then push the rivet through the hole. From the inside slip on the nut on the rivet, hold in place and secure using the rivet gun. If the fiberglass has been repaired you will have to drill a 1/8" hole in the fiberglass, make sure the hole to be drilled is in the exact location as the previous hole.

B. VELCRO:

a) Velcro as a rule is generally trouble free. If the velcro does get damaged or won't hold, it will have to be removed from the part and new velcro hand stitched back on. Velcro can be purchased at the local fabric store. Velcro that is clogged with fur can be cleaned by running a comb or small screw driver along the edge of the velcro, then brush the fur away from the velcro.





EYE BALLS AND EYE LIDS

DESCRIPTION: The eyes are constructed of machined delrin with a steel shaft pressed in. The iris of the eye's are painted to suit each character, and a clear lens pressed in.

The eye lids are made of nylon, which is molded in an extrusion process, drilled and painted to suit each character. There are no differences in the eye balls or eye lids other than painting, with the exception of Earl. There is no shaft in earl's eyes and his eye lid is made of fur. Maintenance is very important to the eyes and eye lids and should be part of the characters Weekly P.M.

1. PROBLEMS AND REPAIR:

A. EYE BALLS:

a) Other than normal P.M. there is not much to be done on the eye balls, except to replace them if they get damaged. If eye balls need to be replaced or removed for any reason, See the repair section on heads pages 3-042 thru 3-047.

B. EYE LIDS:

a) Eye lids that have the paint worn off or scratched, can be touched up, using a cotton swab. Under NO Circumstances, is the entire eye lid to be brush painted. If an artist is available, airbrushing the eye lid would yield the best results. You will have to remove the eye lids to have them air brushed. See the repair section on heads pages 3-042 thru 3-047.

b) Eye lids breakages:
Eye lids that have broken actuation levers or have cracked out where the eye lid pivots, can be repaired with 3M- CA 40 glue. This is not a permanent fix, and only serves to buy time until a replacement part is obtained. In the event that this repair does not hold up, disengage the operation of the eye lid in question by shutting off the air supply at the flow control. To remove the eye lid for any reason See the repair section on heads pages 3-042 thru 3-047.

SHOW LIGHTING

DESCRIPTION: There are many types of lights used in the show and they have different functions. The effect lights used are incandescant flood lights of different colors bulbs which are controlled to light up at certain times to give a certain effect.

Spot lights are used to give a particular character, the center stage, so to speak, while doing a song, or light up all the characters at one time. Mini spots do basically the same thing except focus on a certain area of a character. Maintenance is very important to lights and should be part of the weekly P.M.

1. PROBLEMS AND REPAIR:

A. EFFECT LIGHTS:

a) Effect light have very little problems other than bulb replacements. If there is an electrical problem with the effect lights See electrical repair pages 4-011 thru 4-016. Replacement bulb for the most part can be purchased at the local hardware store, or refer to the Rock-A-Fire Parts Catalog.
For location and color of lights see page 5-067.

B. Spot Lights:

a) Bulbs tilted out of adjustment. Loosen the bulb tilt lock screw and then make adjustment with three bulb tilt adjusting screws. See drawing on page 3-187.
b) Hole burned in the shutters. Replace the shutter.
c) Internal lens dirty. Clean internal lens.
d) Spot light bulb replacement.

For any of the above Spot Light Problems See Drawing on page 3-187 and the Rock-A-Fire Parts Catalog.

DRAPES,TRACKS AND DRIVE SYSTEM

DESCRIPTION: The drapes are made of synthetic fibers, and are installed with velcro, or suspended from a track system. The track system is made of steel tubing, cast aluminum brackets and aluminum channel. The cable used in the track system is teflon coated steel cable. The drive system is mechanical gear reduction drive, powered by an electrical motor. A drive chain is used to connect the drive system to the track system. Maintenance is very important to the entire drapery system , and should be part of your P.M. procedures.

1. Cleaning:
   - A. Drapes are to be cleaned by contracting a professional drapery service, and the cleaning to be done at night after store hours.

******** AN IMPORTANT NOTE: FIRE PROOFING And FIRE CODES ********
Some areas have strict fire codes, some are not as strict. After the drapes have been dry cleaned, it will be necessary to retreat and recertified to the fire proofing codes in your area.

   - B. The drapes should never be removed, if it is necessary to remove the drapes the following instruction should apply. First remove the vertical panels (tied back on each side of the platform). Next remove the Jaboe. The velcro under both, the vertical panels and jaboe should now be removed. Remove the velcro with care. Now the valances can be taken down, and they are also attached with velcro. Some stores the valances may have been stapled up. Now that ever thing has been removed you can now takedown the main drapes. Re-installation is a reverse of the above.

2. Problems and Repairs:
   - A. If there is any electrical problems See electrical repair pages 5-010 and 5-011
   - B. If the draperies are damaged due to rips and tears, you may have then sewn and repaired locally.

COSMETIC PROPS, CARPETS AND GRASS MATS

DESCRIPTION: These items are made of either fabric, wood or fiberglass. Once they are in place on the platform, there will be very little repair needed, as these have no movements. Cleaning should be dusting and light vacuuming. Maintenance is very important to these items and should be part of your P.M. procedures.

1. Problems and Repair:
   - A. Back drop that is ripped, should be stitched up as invisibly as possible.
   - B. Grass Matts that need repair, you may either staple a new piece over the worn portion or cut out the worn area and staple in a new piece.

Any replacements parts can be found in the Rock-A-Fire parts catalog.

ROLFE AND EARL'S CLOTHES

1. Rolfe's Clothes

A. Rolfe's shirt is made of two parts and each is attached by velcro closures. Be sure to open the velcro carefully so you don't rip it apart. Take the right half and put the side over Earl, adjusting it over the body. You may start at either end, making sure that the velcro matches evenly. Don't leave any gaps. When closing the right arm, make sure the sleeve is not bunched up or binding. This would result in unnecessary wear.
Repeat the same procedure for the left half of the shirt. Make sure that all the seams are uniform and without gaps.

B. Rolfe's vest is one piece, so do not try to separate the vest in front. There is a velcro closure on the right shoulder and one in the back, open each one of these. Place the vest around the shoulders and close the velcro. Next, close the velcro on the back. Be sure to match up all the closures. Place the top of the vest under the collar of Rolfe's shirt.

C. Rolfe's tie is easy to attach, with velcro on the back of the tie, stick it to the patch of velcro at the neck of the shirt.

2. Earl's Costume

A. Earls vest is one piece with velcro in the back of the vest. Do not try to unbutton the vest, it is sewn. Open the velcro closure in the back and insert Earl's right hand through the opening for the right arm. Insert the left arm through the opening. Start from the top or the bottom and close the back of the vest. Position it accordingly.

B. Earl's pants can be put on as you would your own pants, Be sure that the rope belt has the tie in the front. There are two snaps that hold the pants in place. Position the pants so that they are not twisted or bunched up in the front.

C. Earl's foam and denim hat with orange hair go on last. Sit the hat on his head with the bill facing the front and securely snap the three snaps.

DOOK'S SPACE SUIT

1. Wrap the long straightened edge of the pants around the character's waist and fasten the snaps with velcro in the center of the back. Carefully drape the pant leg around his foam leg and attach down the center back with velcro (the fabric needs to be shifted quite a bit to form a smooth appearance). Tuck the bottom of each pant leg and the foam leg back into the character's boot.

2. Place the vest over the character's vinyl torso with the "D" emblem in the center front. Pull the left and right sides around in order to fasten them down the center of the back. Match the velcro pieces on the shirt, center front, and each side, to the velcro on the waist edge of the pants.

3. Put the straps over each shoulder and snap them to each side of the back.

4. To attach the hard collar, place the side wings of the collar underneath each strap from the outside facing inward. The velcro of the straps should match up to the velcro on the side wings of the collar. The back of the collar will stick with velcro to the outside of the top of the vest. Check to be sure that the collar is centered on the shoulders of the character.

5. Center the latex belt over the waist edge where the vest and the pants meet. Snap the belt in the center of the back.

6. The left and right sleeves are identical. Simply wrap the opened sleeve around the character's arm, with the closure to the back, and fasten the snap at each end. Close the velcro. Tuck the top of the sleeve under the yellow band of the torso and the bottom of the sleeve under the cuff.

FATZ JACKET WITH SHIRT AND BOW TIE

Place both left and right hands into the sleeves of the jacket up over his shoulders. Be careful not to bend up or pull off his hands. Reach inside the sleeves to straighten out the lining and drape the shoulders into place over his fiberglass shoulders and arms. Close the center back velcro closure. Position the jacket and shirt so that there are no strange "pulls" or wrinkles. Check the neck edge to be sure that no fur is coming out or folded wrong. Check the center front at his waist and be sure the jacket comes down to his fur pants so that none of the fiberglass body shows.

The shirt should have a piece of male velcro at the center top, this attaches the bow tie. Straighten out the bowtie so that it is centered evenly on his neck.

BEACH BEAR SHORTS (Hawaian Print)

Wrap the long waist edge (with elastic) around the character's waist, with four snap closures in the center of the back. Slip the "U" shaped flap underneath his body in the center front. Pull to the back and attach double snaps on each side of the back (Be careful of your hands near the fiberglass). Wrap the front and right back leg pants around the character's right thigh and close the velcro underneath his leg. Do the same for the left thigh. Position the shorts so that there are no strange tucks or wrinkles and that no fiberglass is showing.

MITZI'S SKIRT AND SWEATER

1. Mitzi's skirt fastens in the center back with a single snap at the waist, with velcro down the edges. (When fastening velcro, match both ends first and work your way towards the center).

2. To put on Mitzi's sweater, open all velcro closures first, then slip the left sleeve over her left hand, being careful not to pull on her pom-poms. (The "M" goes towards the front). Drape the right sleeve over her right arm and shoulder and fasten the velcro closure all the way from her wrist, through her under-arm, up to her waist. (Remember, it is easier to start at each end and work towards the center).

3. Close the left and right back of the sweater at the center. Position the sweater so that the "M" is in the center. Make sure the "V" neck is not hanging too low so that her latex chest shows. Place the waist band of the sweater at her waist so that the top drapes down nicely.

BILLY BOB OVERALLS

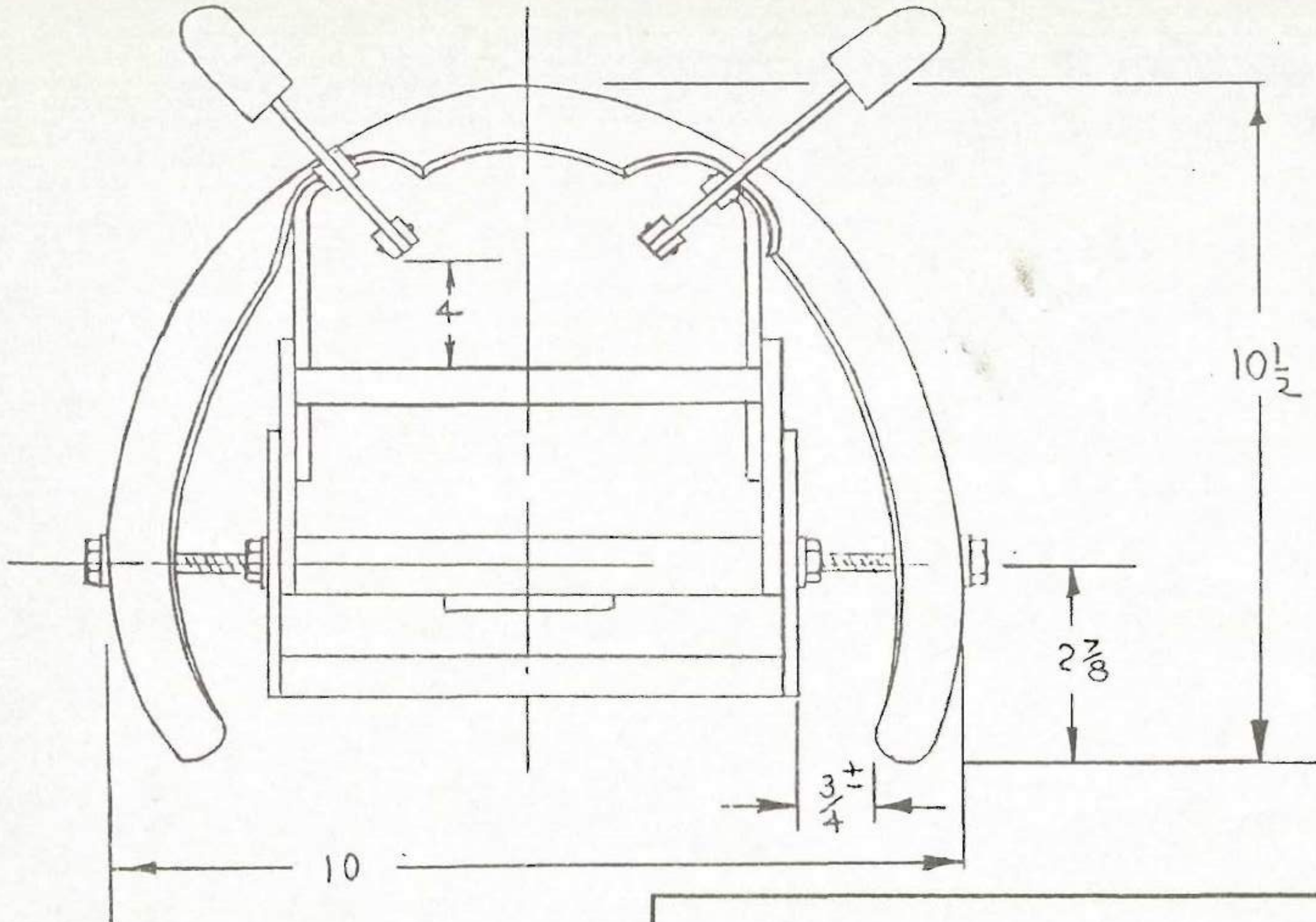
To put on Billy Bob's overall, you must first unsnap all of the closures. Wrap the waist edge around the character waist with the bib to the front, under the guitar mounting mechanism and the snap closure to the center back. This waist edge should sit at about the widest part of his body.

With the two snaps on the top of the bib, pull the bib up around the guitar mounting mechanism. Center the hole in the bib underneath the guitar so that no fur can be seen from the audience. Place a strap over each shoulder. Cross them in the back and snap them to either side of the waist. (There is a selection of snap placements on the straps which can be used to adjust the proper length).

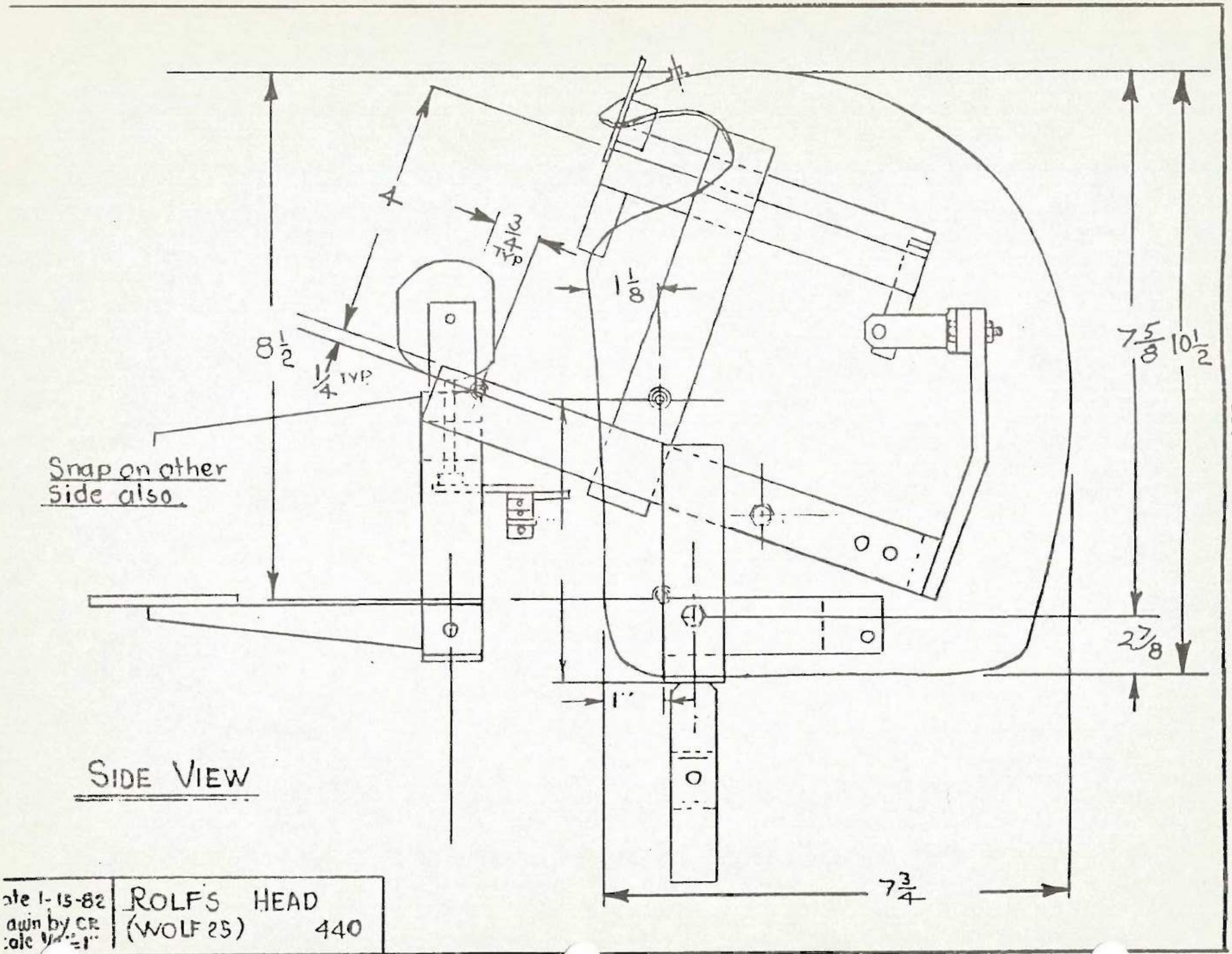
When snapping together the crotch of the overalls, be sure that the pants are not pulled up too high. This will cause a funny looking fit. Snap the left front and the right back to the right front. If strange wrinkles appear at this point, you probably have your waist too high; re-snap the straps and pull the pants down until the bottom is just above the character's feet.

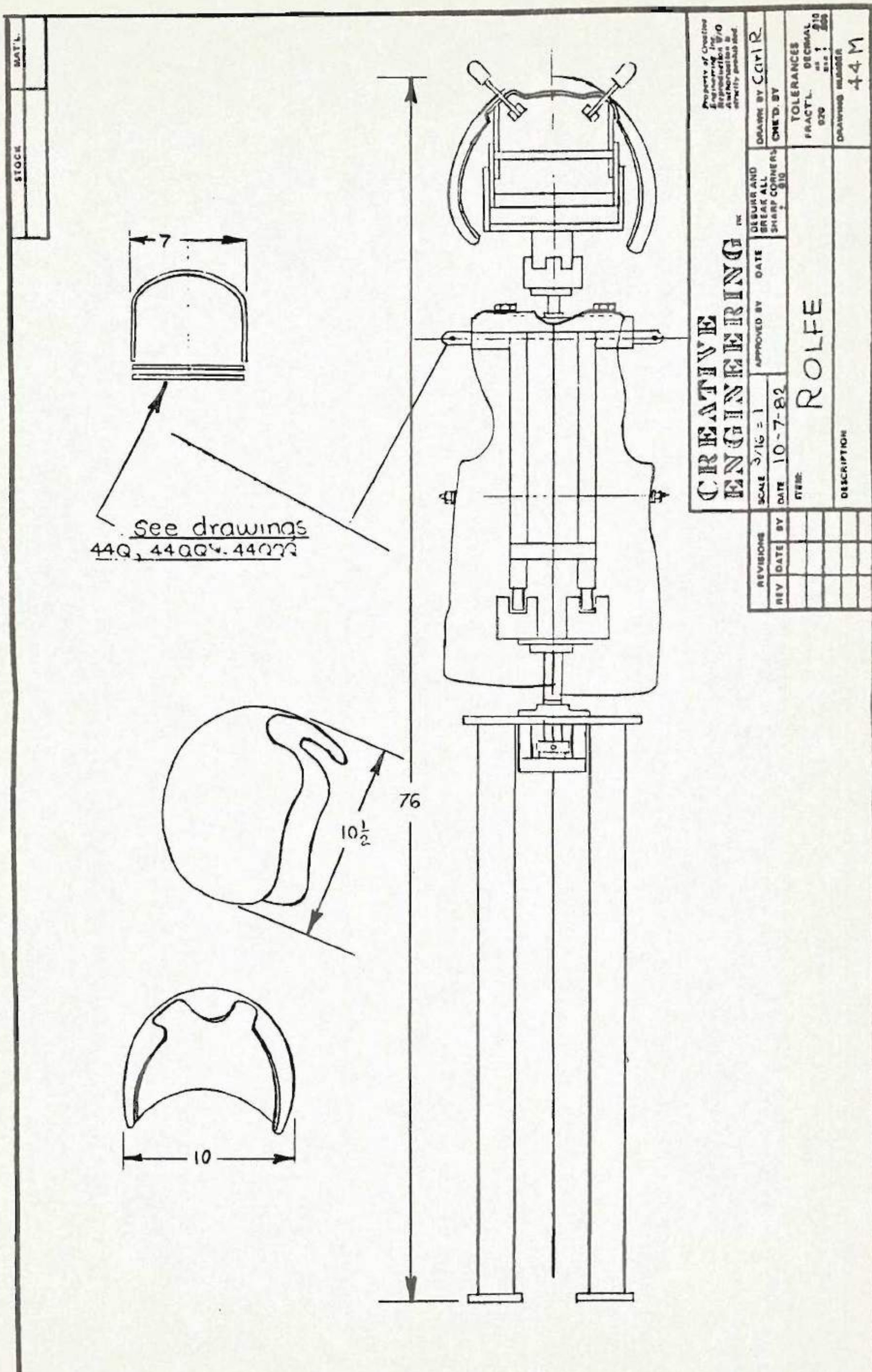
CHARACTER FIBERGLASS PLACEMENT PRINTS

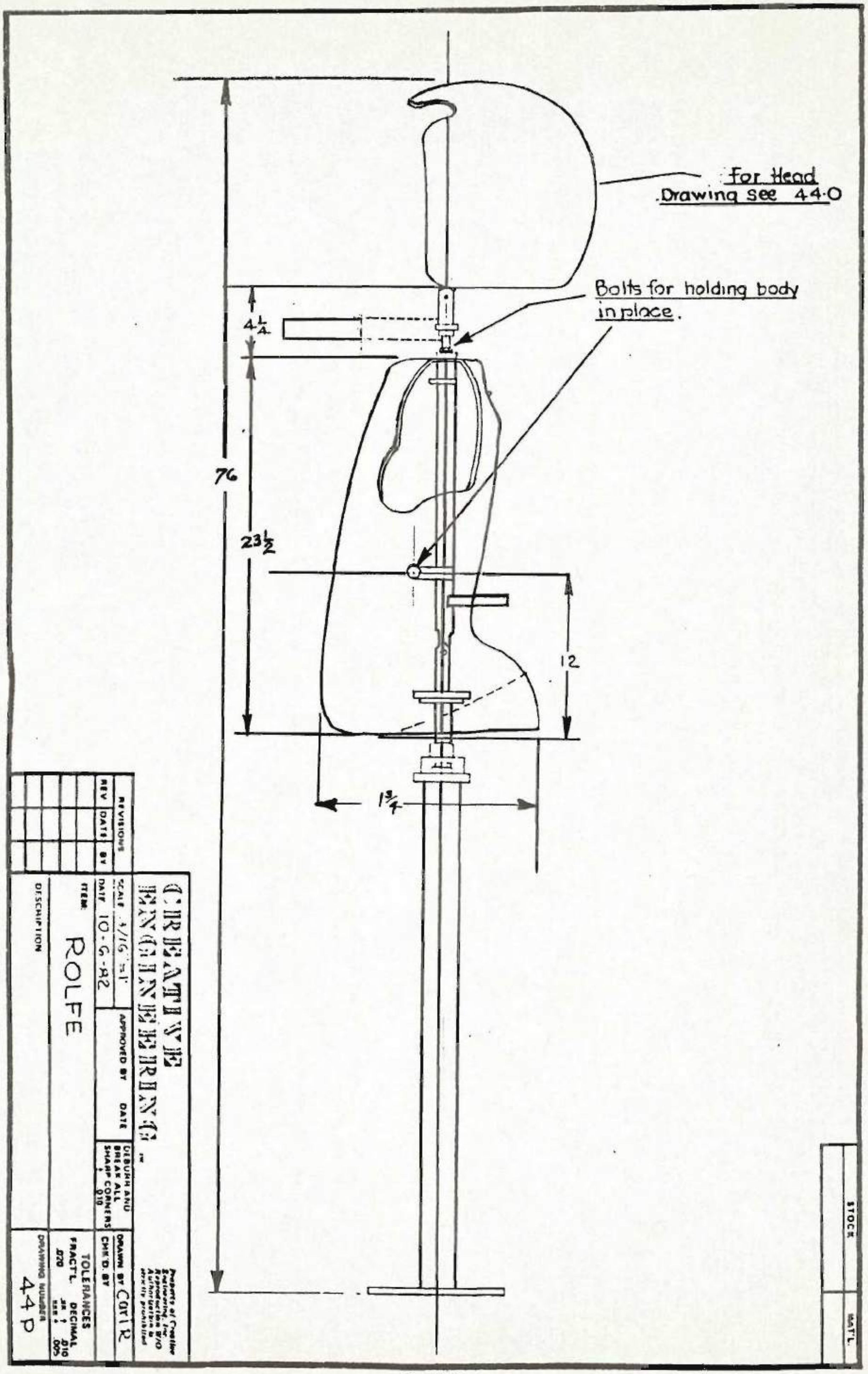
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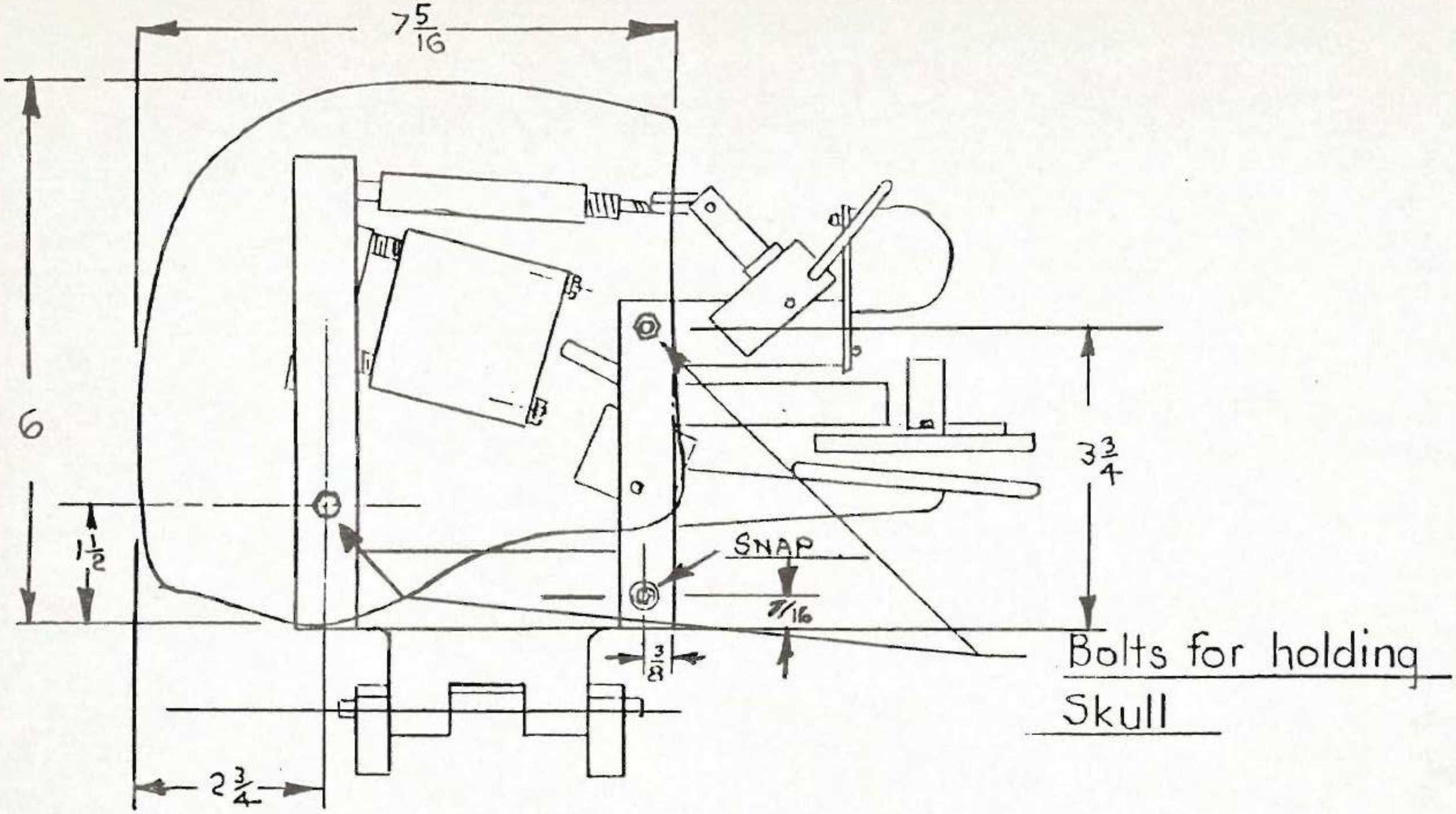


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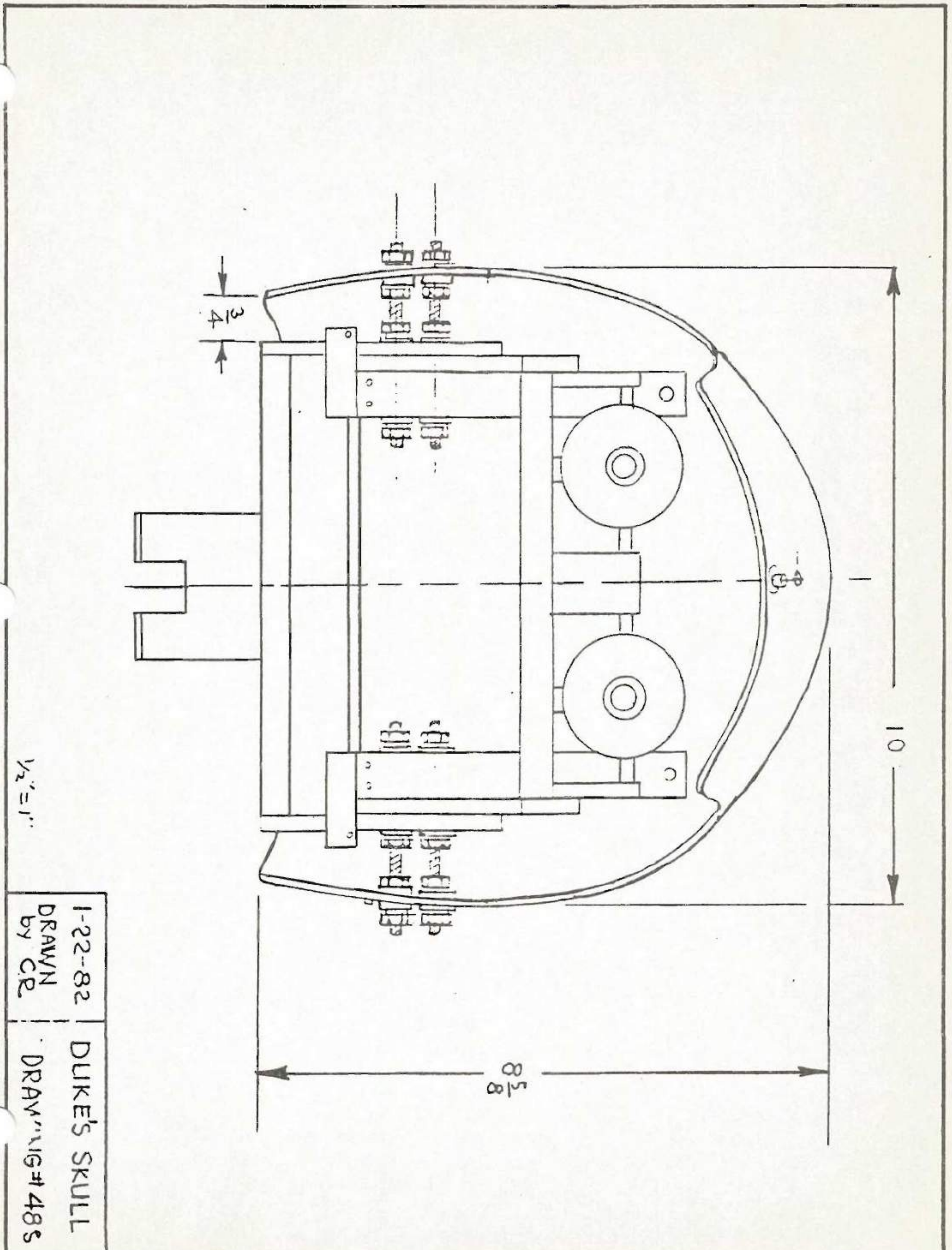

Snap on other side also.
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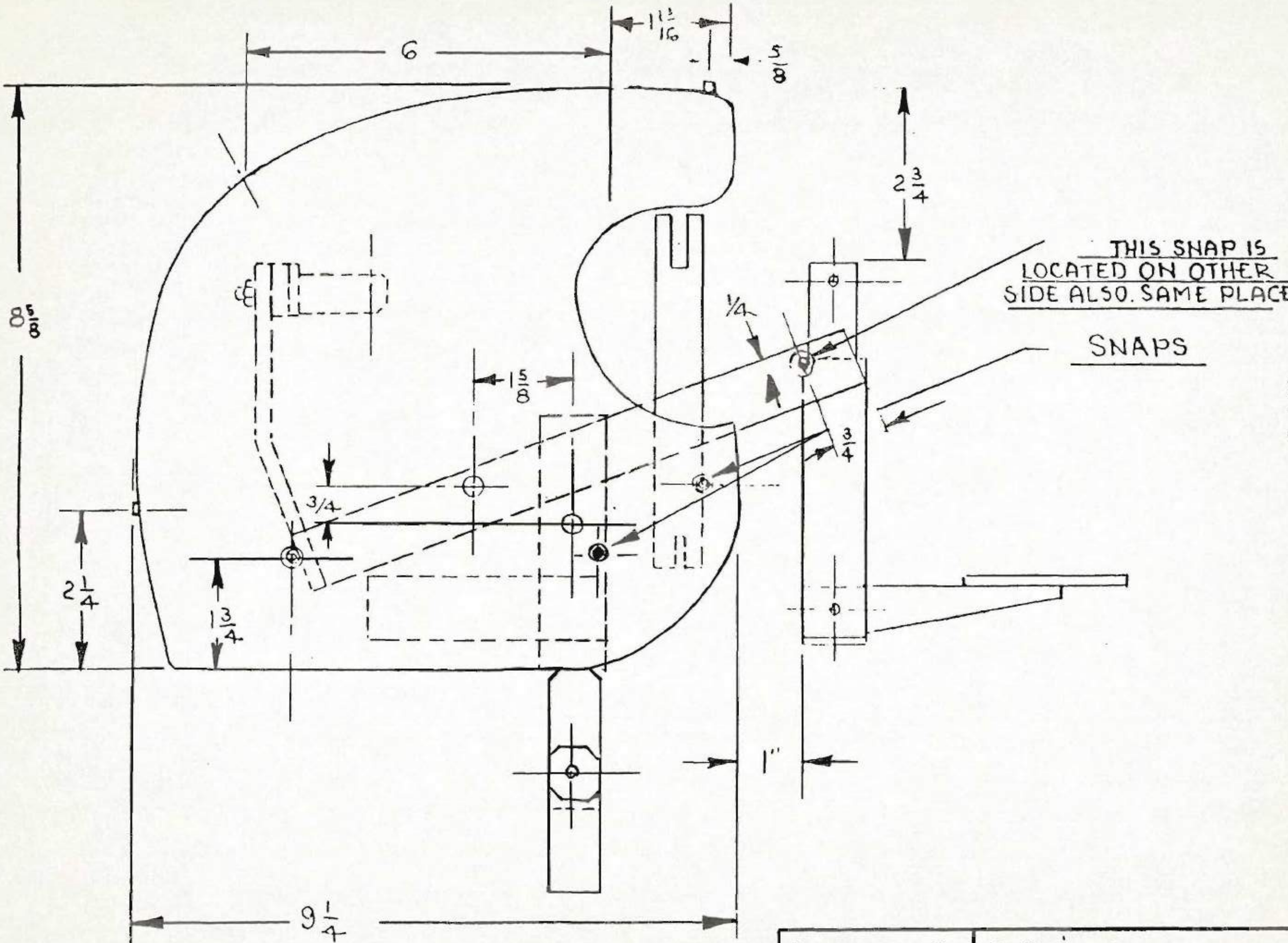

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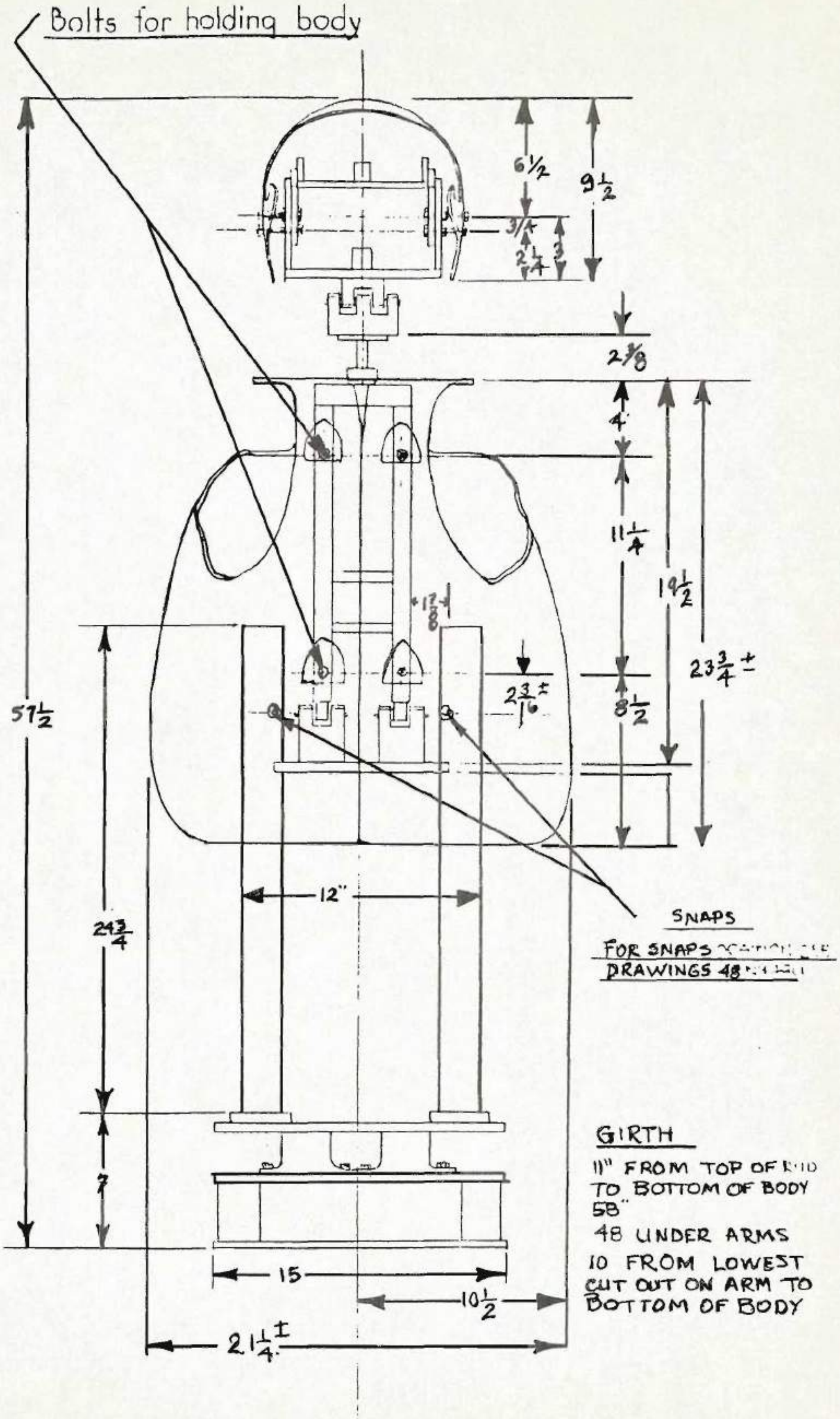


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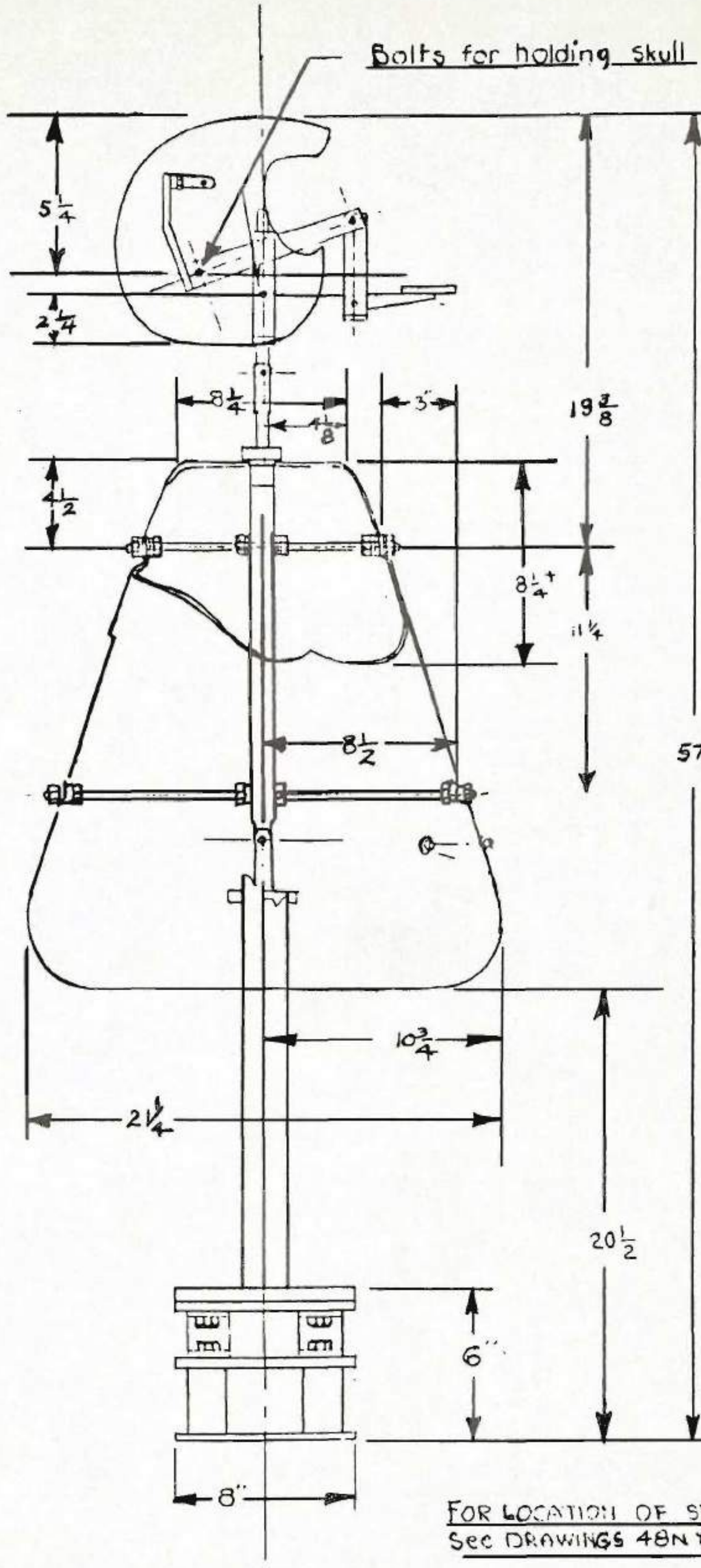

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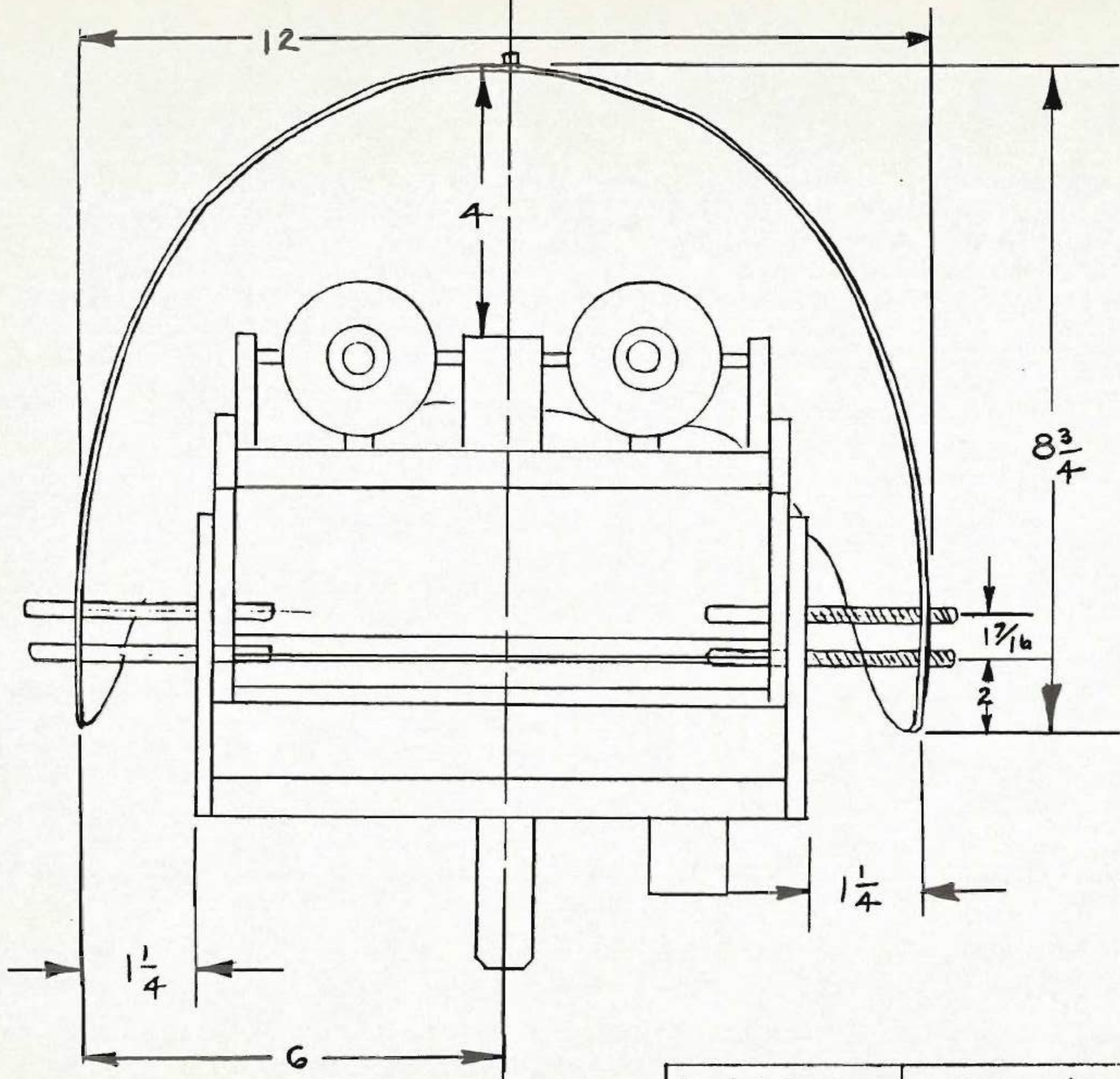
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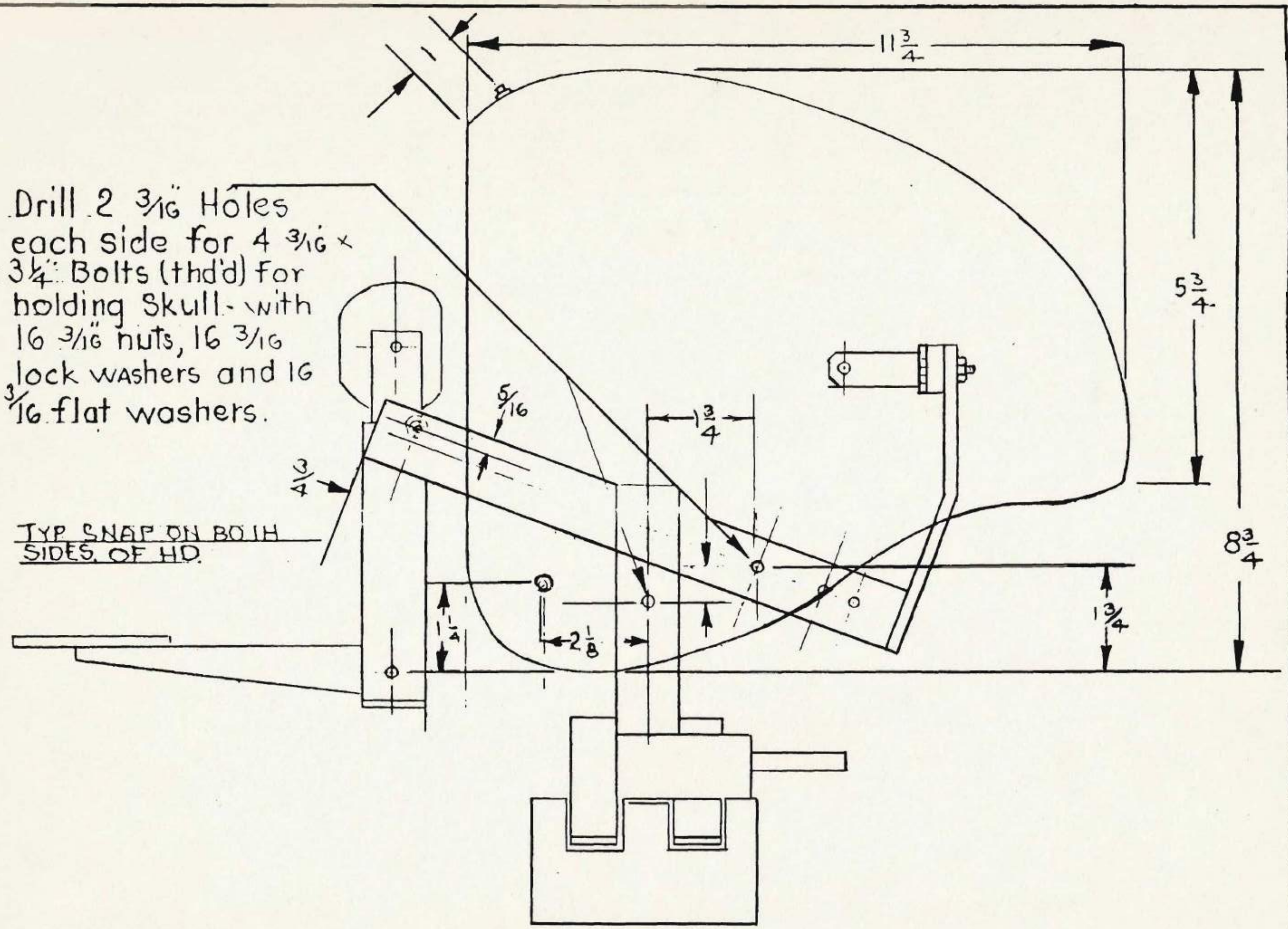
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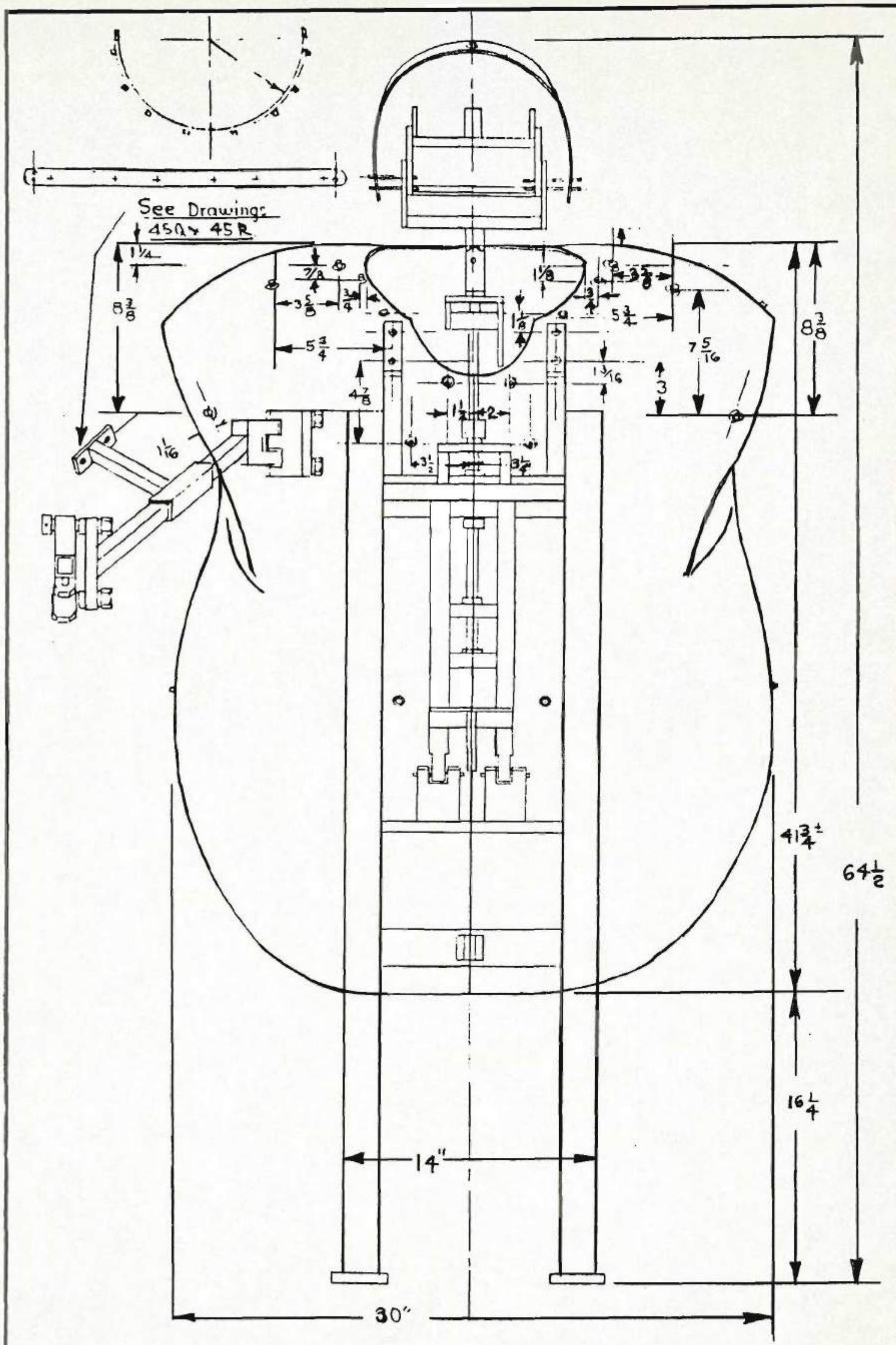
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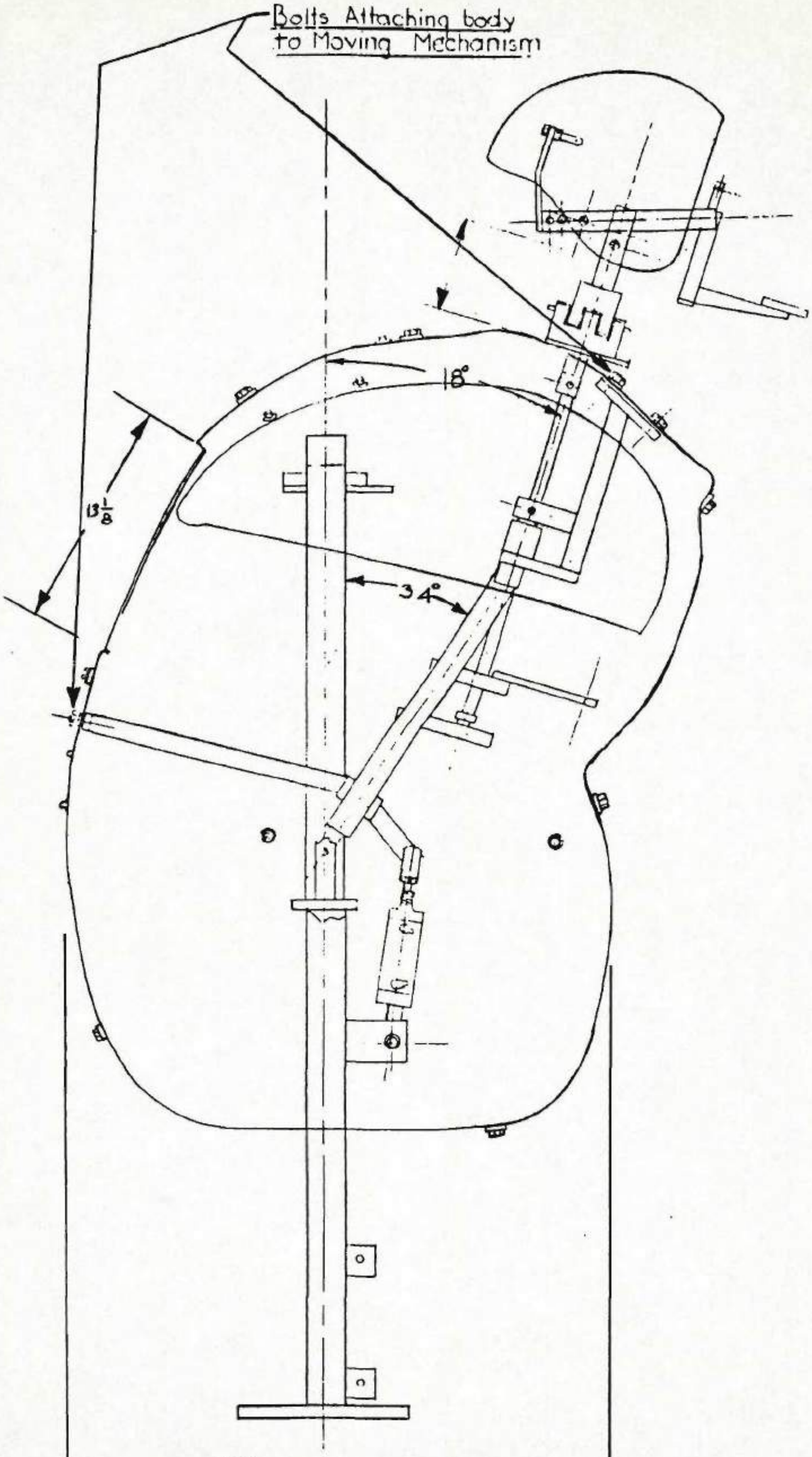
Date 2-5-82	FATZ'S SKULL
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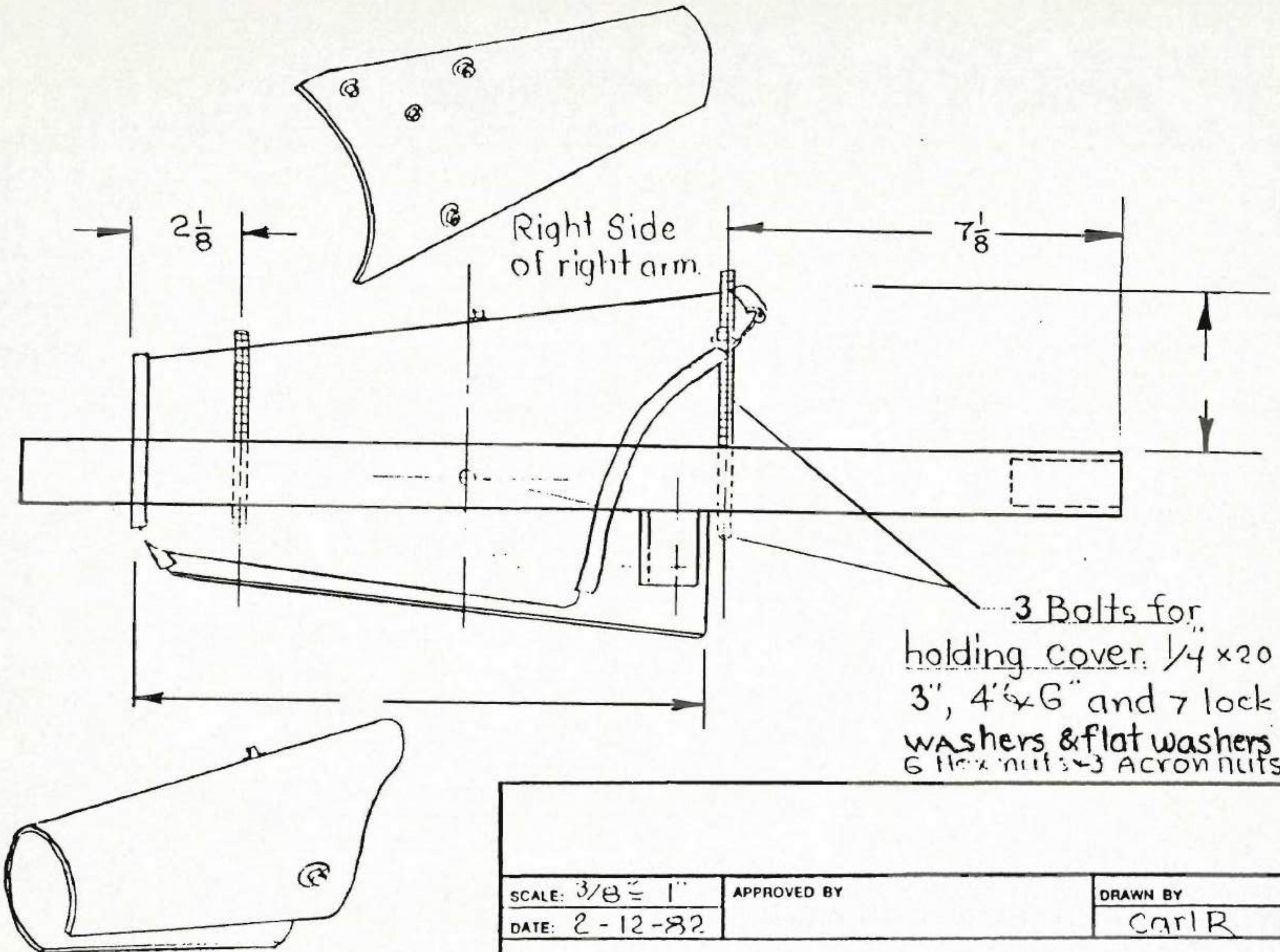
le 2-4-82 Drawn by C.R.	Fats-skull scale 1/2" = 1" DRAWING 45 K



DATE 2-18-82 DRAWN by C.R.	FATS - FRONT VIEW 3/16 = 1" DRAWNG # 45P



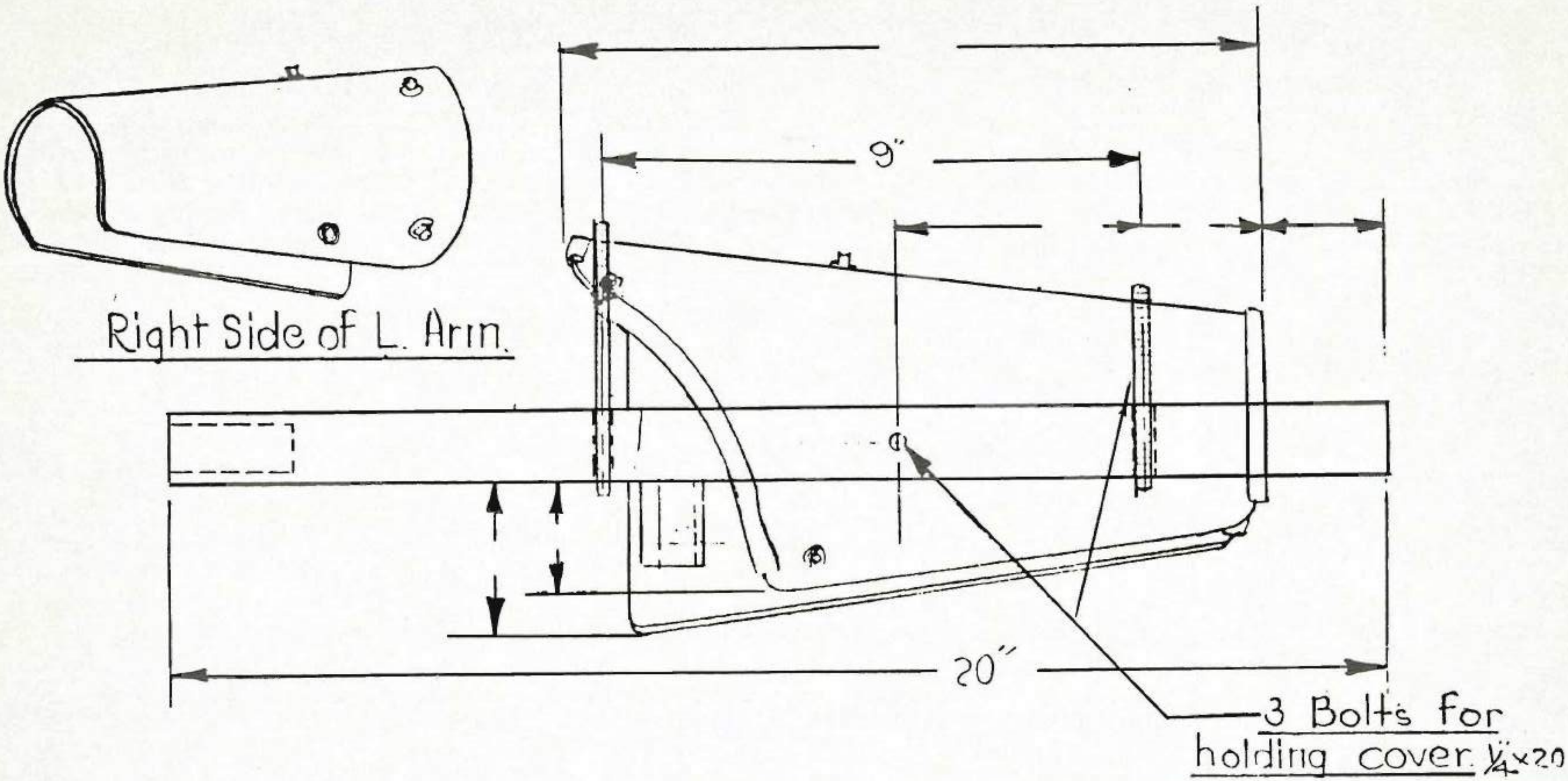
DATE 2-17-82 | FAT'S: RIGHT SIDE
DRAWN by CR | scale 1/16"=1" DRAWING #45 Q

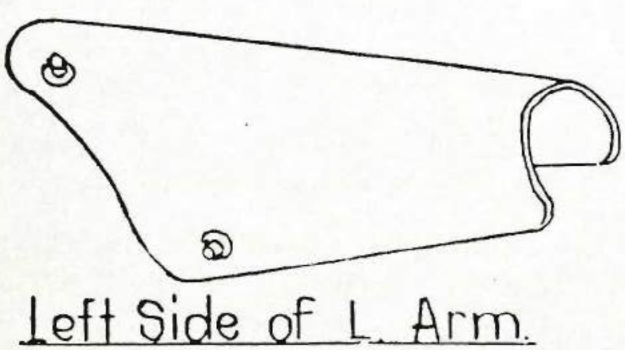


SCALE: 3/8" = 1"	APPROVED BY
DATE: 2-12-82	DRAWN BY: Carl R

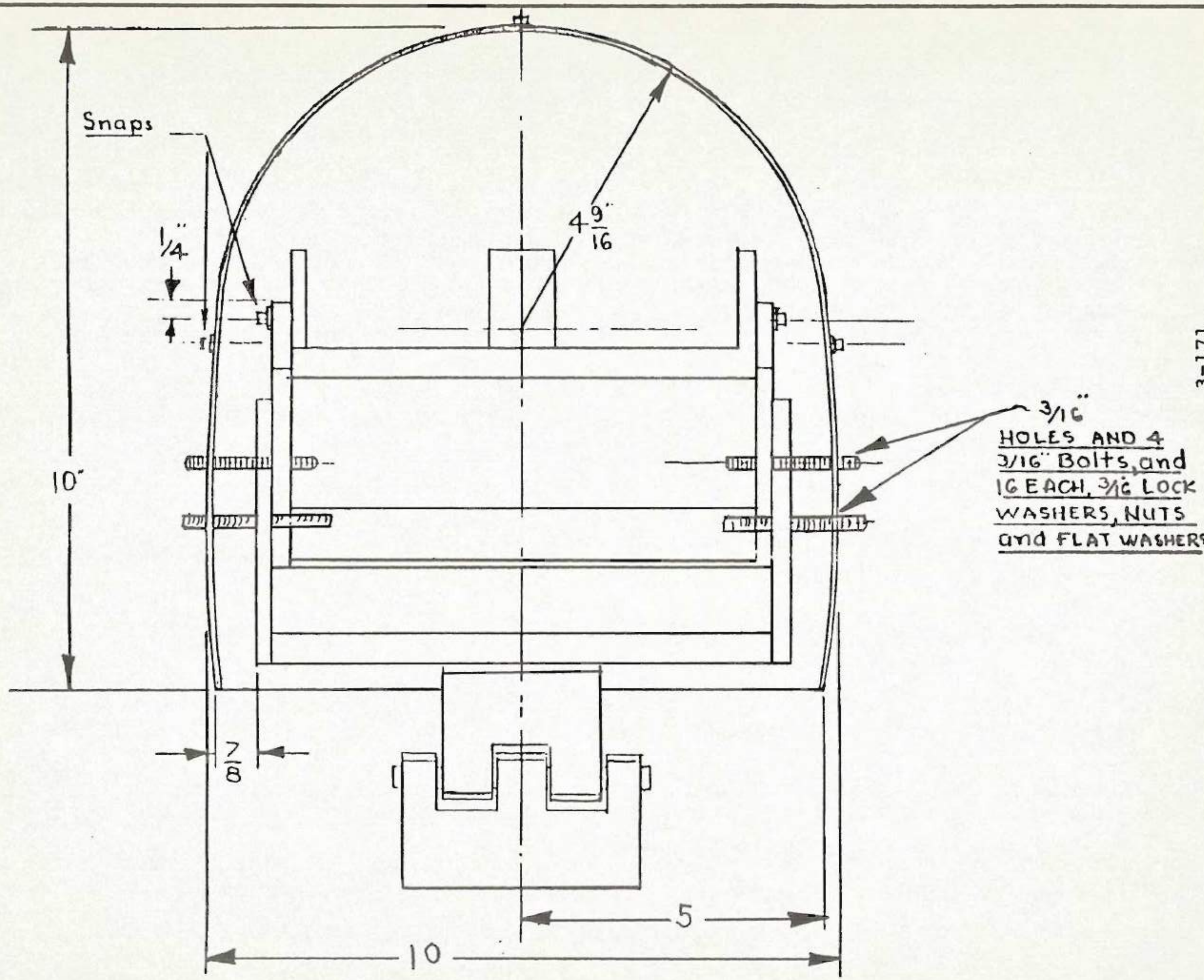
GORILLA- RIGHT FOREARM COVER

DRAWING NUMBER: 45 P

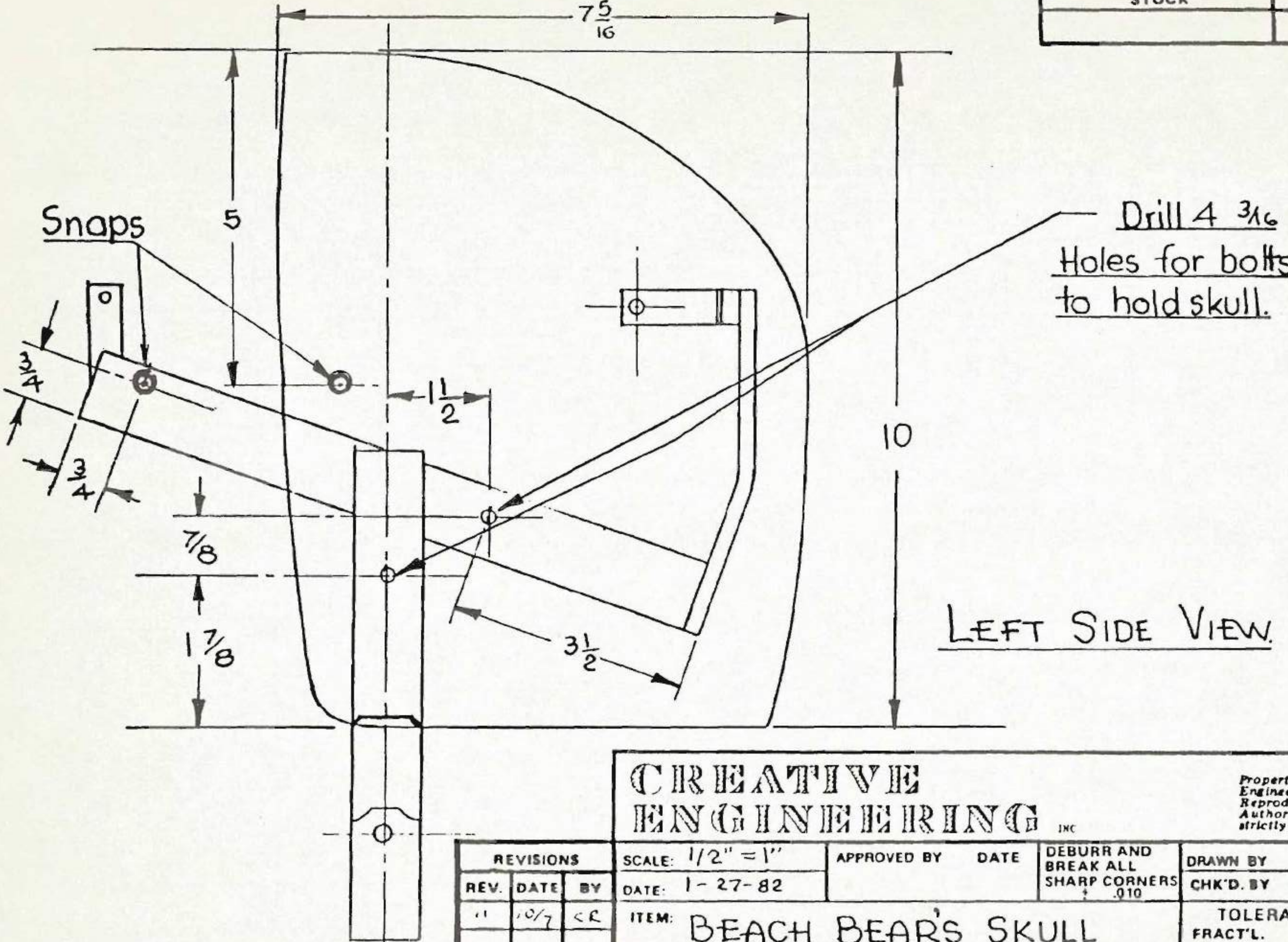




SCALE: 3/8" = 1 DATE: 2-12-82	APPROVED BY	DRAWN BY Carl R
Gorilla. - Left Forearm Cover		
		DRAWING NUMBER 450



DATE 1-26-82 DWN by C.R.	BEACH BEAR 1/2" = 1'	(DIMENSI...) DRAWIN... NO 42 X

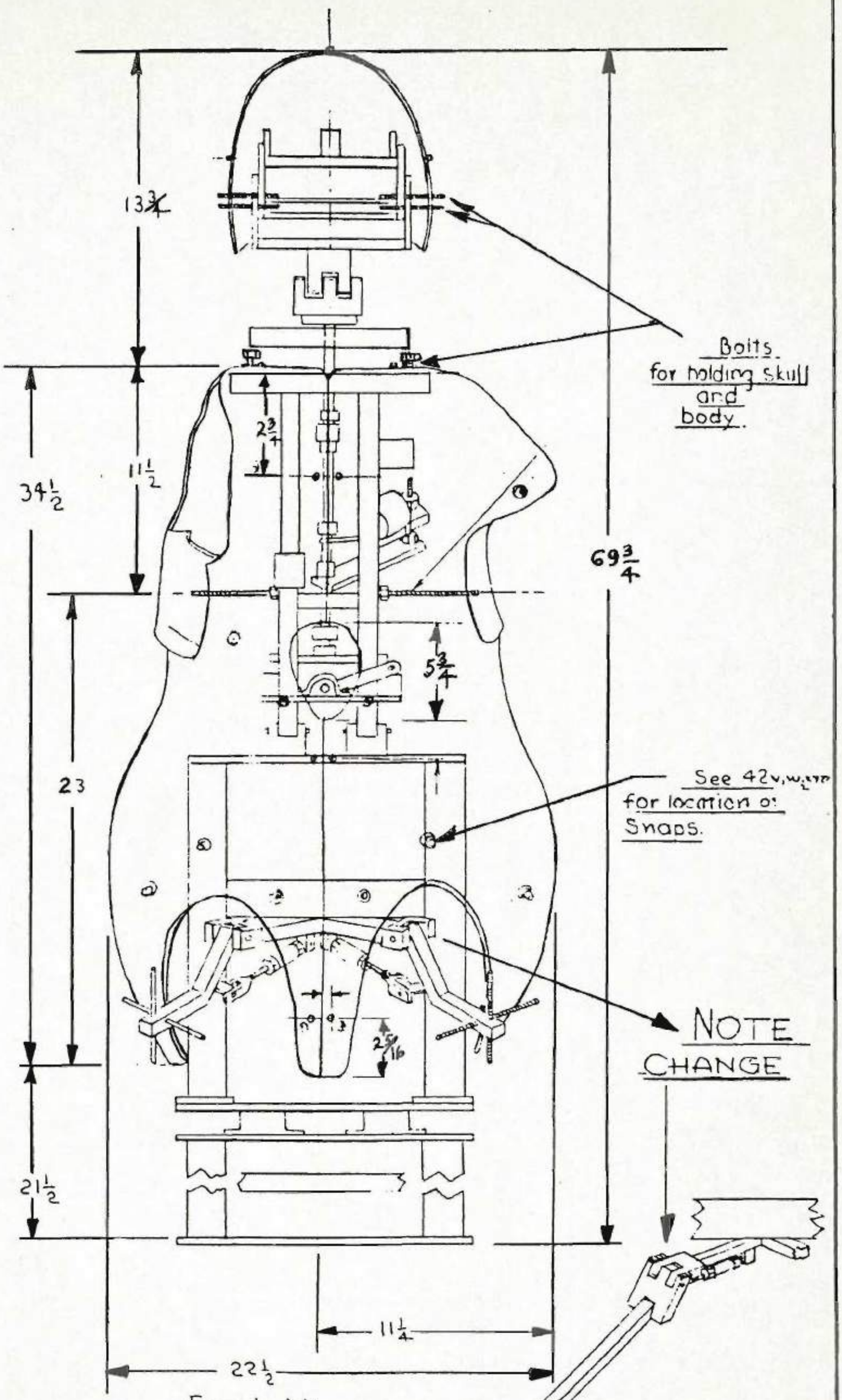


STOCK	MAT'L.

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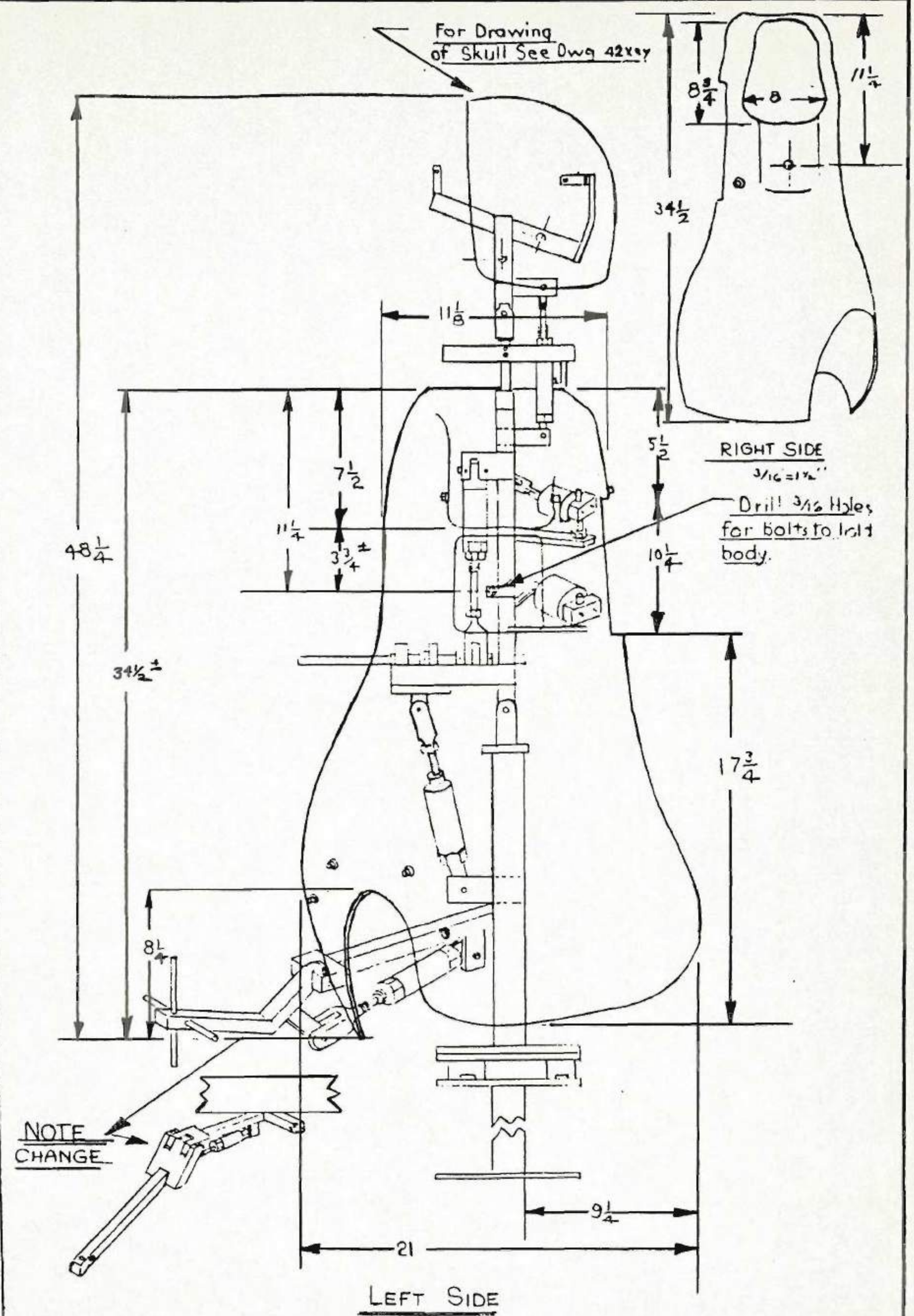
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REVISIONS			SCALE: 1/2" = 1"	APPROVED BY	DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	DRAWN BY
REV.	DATE	BY	DATE: 1-27-82				CHK'D. BY
11	10/7	CR	ITEM: BEACH BEAR'S SKULL				TOLERANCES FRACT'L. .020 DECIMAL .xx ± .010 .xxx ± .005
			DESCRIPTION:				DRAWING NUMBER 2Y

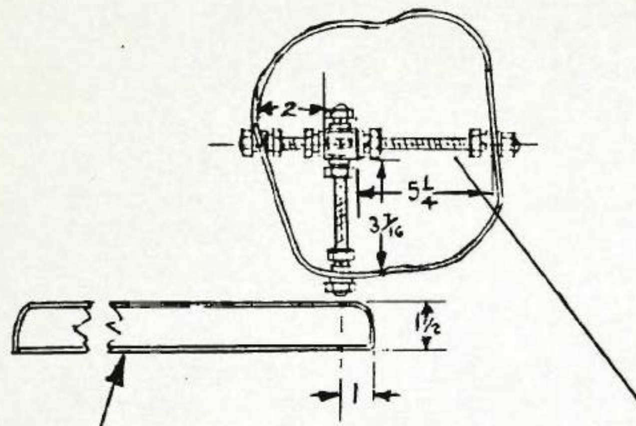


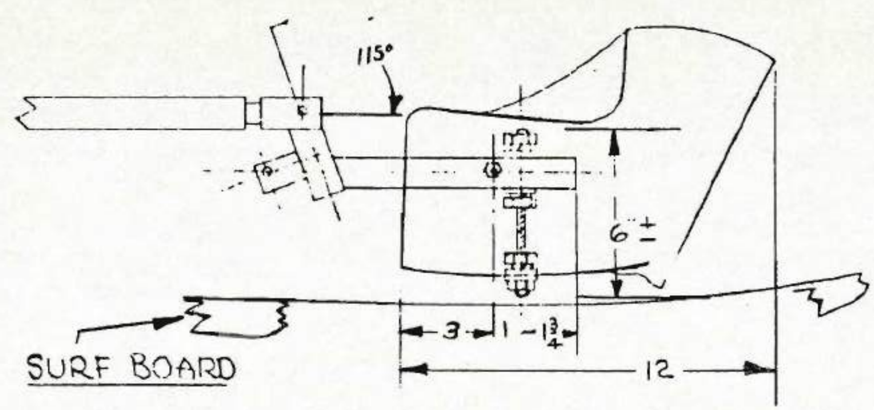
Front View

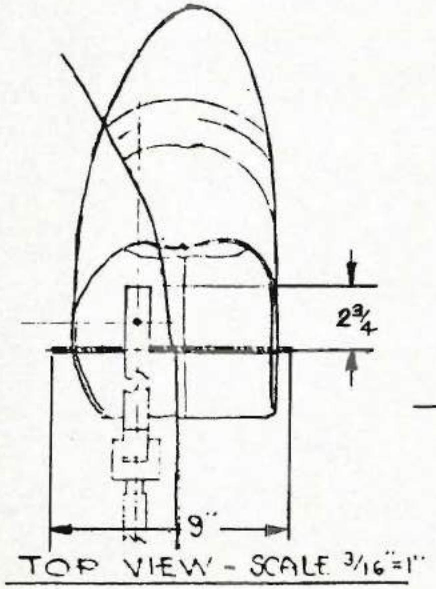
3/16 = 1"	DATE 1-25-82 DRAWN by C.R	BEACH BEAR (DIMENSIONS) DRAWING NO. 42V

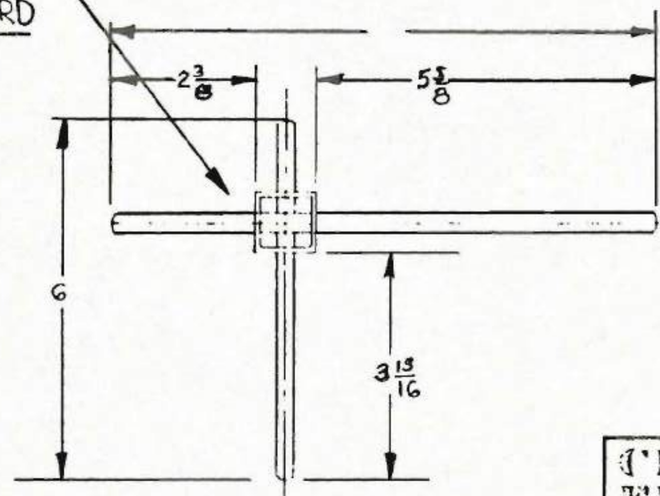


3/16" = 1"	DATE 1-26-82 DRAWN by C.R.	BEACH BEAR (DIMENSIONS) DRAWING NO 42W









BILL OF MATERIAL

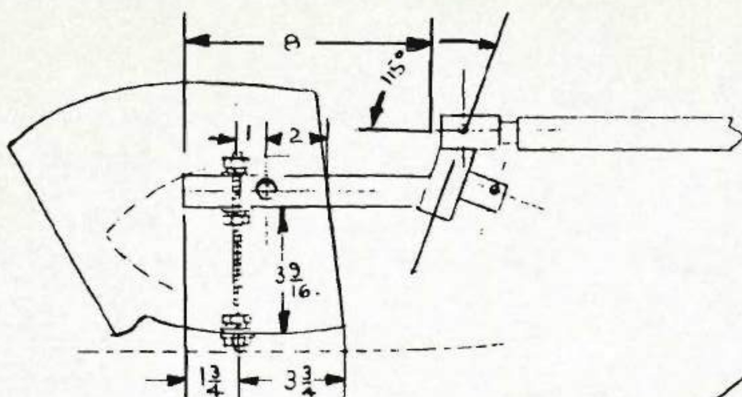
1. 1 FOAM LEG WITH FIBERGLASS PART.
2. 1 5/16"-18 x 6" THREADED BOLT.
3. 1 5/16"-18 x 9" THREADED BOLT.
4. 10 5/16"-18 HEX NUT
5. 6 5/16 LOCK WASHERS
6. 10 5/16 FLAT WASHERS

STOCK	MAT'L

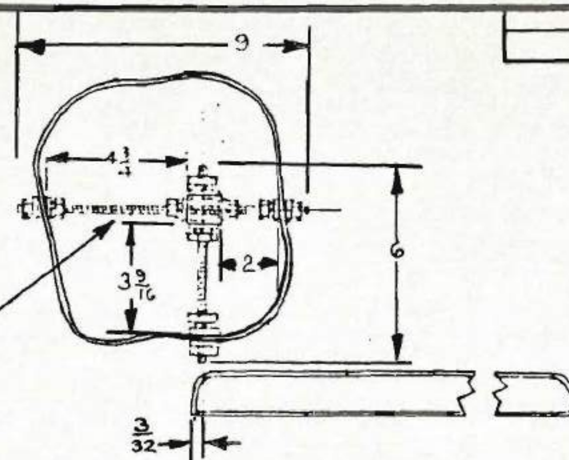
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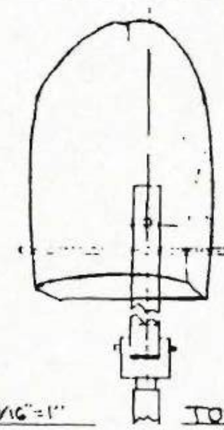
REVISIONS			SCALE 1/4" = 1"	APPROVED BY DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	DRAWN BY [illegible]
REV	DATE	BY	DATE 10-14-82			CHK'D. BY
			ITEM: BEACH BEAR R. LEG			TOLERANCES FRACT'L .020 DECIMAL .XX ± .010 .XXX ± .005
			DESCRIPTION RETRO-FIT			DRAWING NUMBER 42II



SCALE 1/4 = 1"



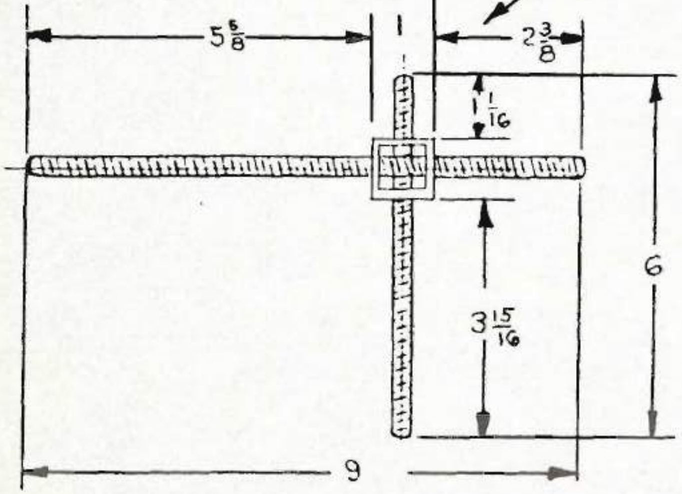
BACK LOOKING FORWARD – 1/4" = 1"



SCALE 3/16" = 1"   TOP VIEW

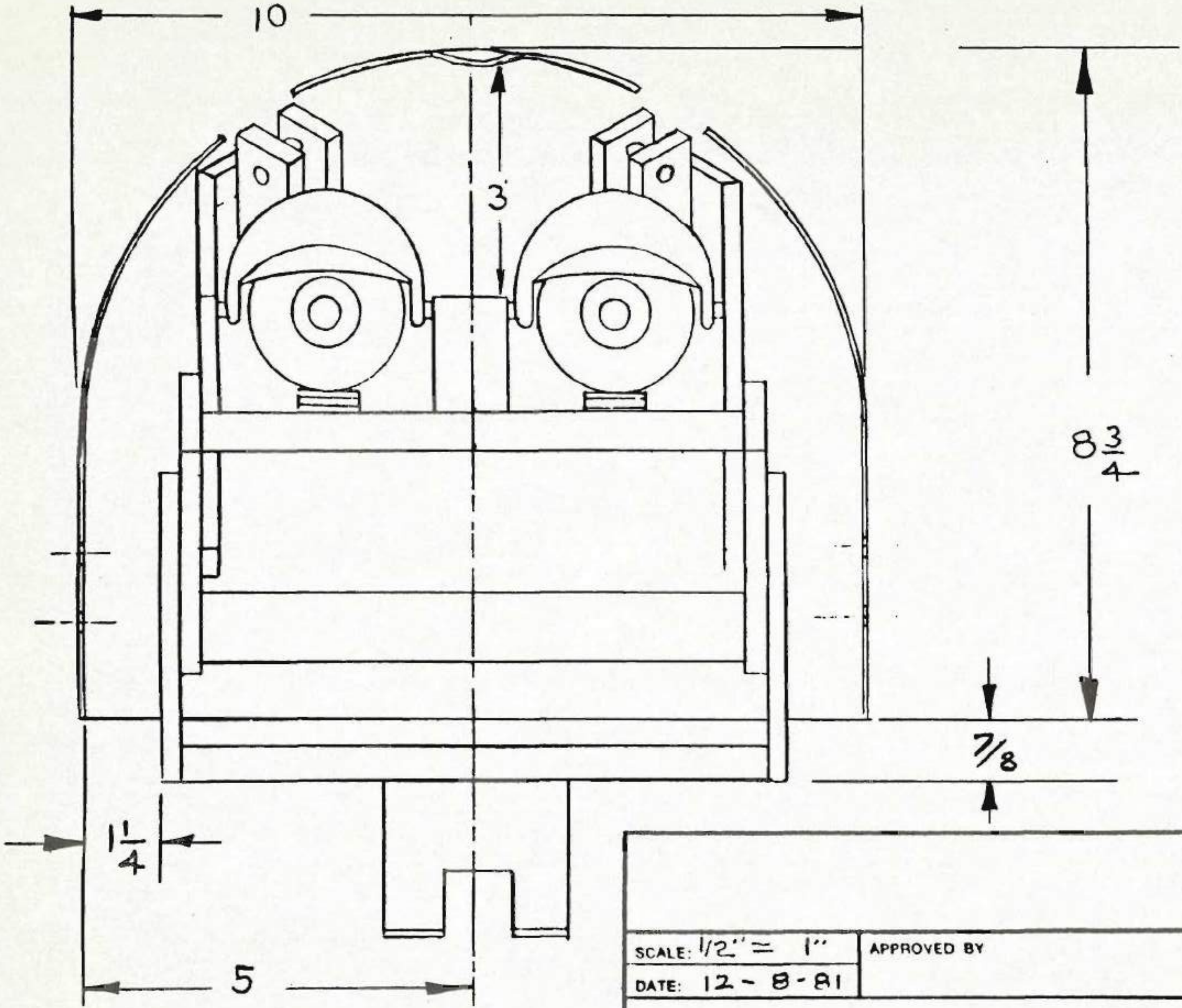
BILL OF MATERIAL

1. FOAM LEG WITH FIBERGLASS PART.
2. 1 5/16"-18 x 6" THREADED BOLT.
3. 1 5/16"-18 x 9" THREADED BOLT.
4. 10 5/16"-18 HEX. NUTS.
5. 6 5/16 LOCK WASHERS.
6. 10 5/16 FLAT WASHERS



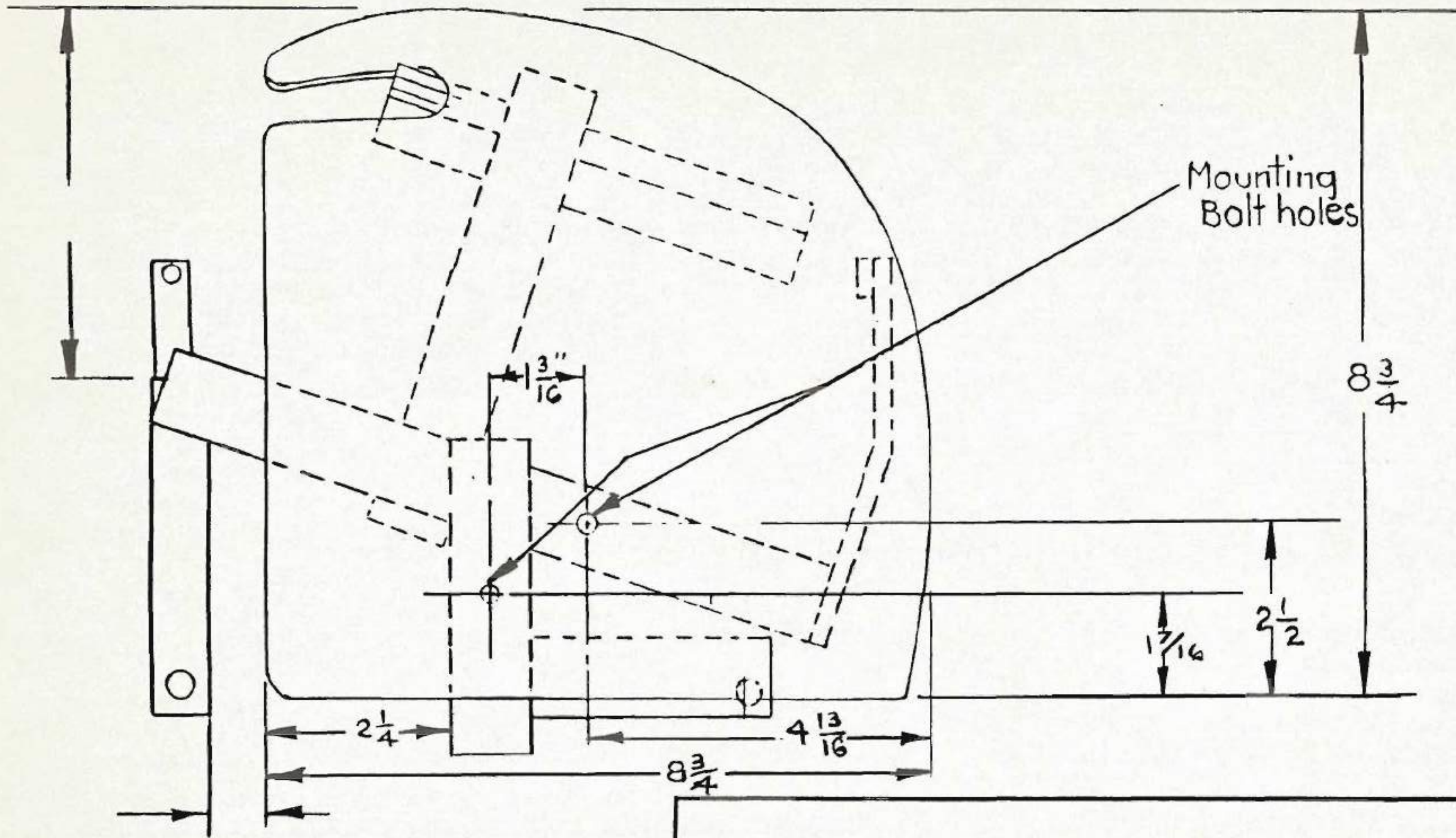
SCALE 1/2" = 1"

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REVISIONS: REV / DATE / BY	
SCALE	DRAWN BY CAC
DATE 12-15-82	APPROVED BY / DATE
DEBURR AND BREAK ALL SHARP CORNERS ± .010	CHK'D BY
ITEM: BEACH BEAR LEFT LEG	TOLERANCES: FRACT'L ±.020; DECIMAL .XX ± .010, .XXX ± .005
DESCRIPTION: RETRO-FIT.	DRAWING NUMBER 42111
STOCK	MAT'L



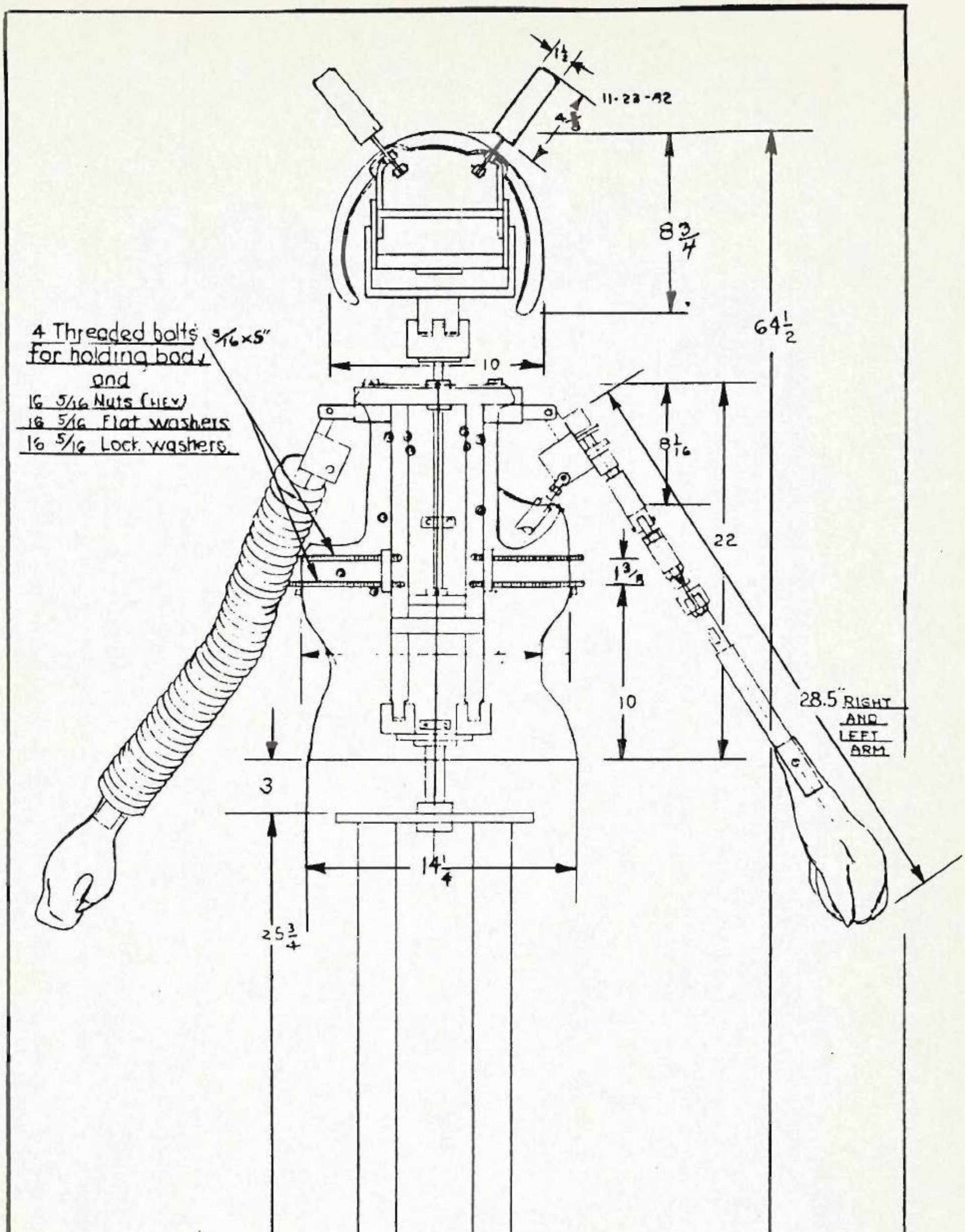
Front View

SCALE: 1/2" = 1"	APPROVED BY	DRAWN BY
DATE: 12 - 8 - 81		D. & CR
MITZI'S HEAD -- SKULL		
19440		DRAWING NUMBER 41 R

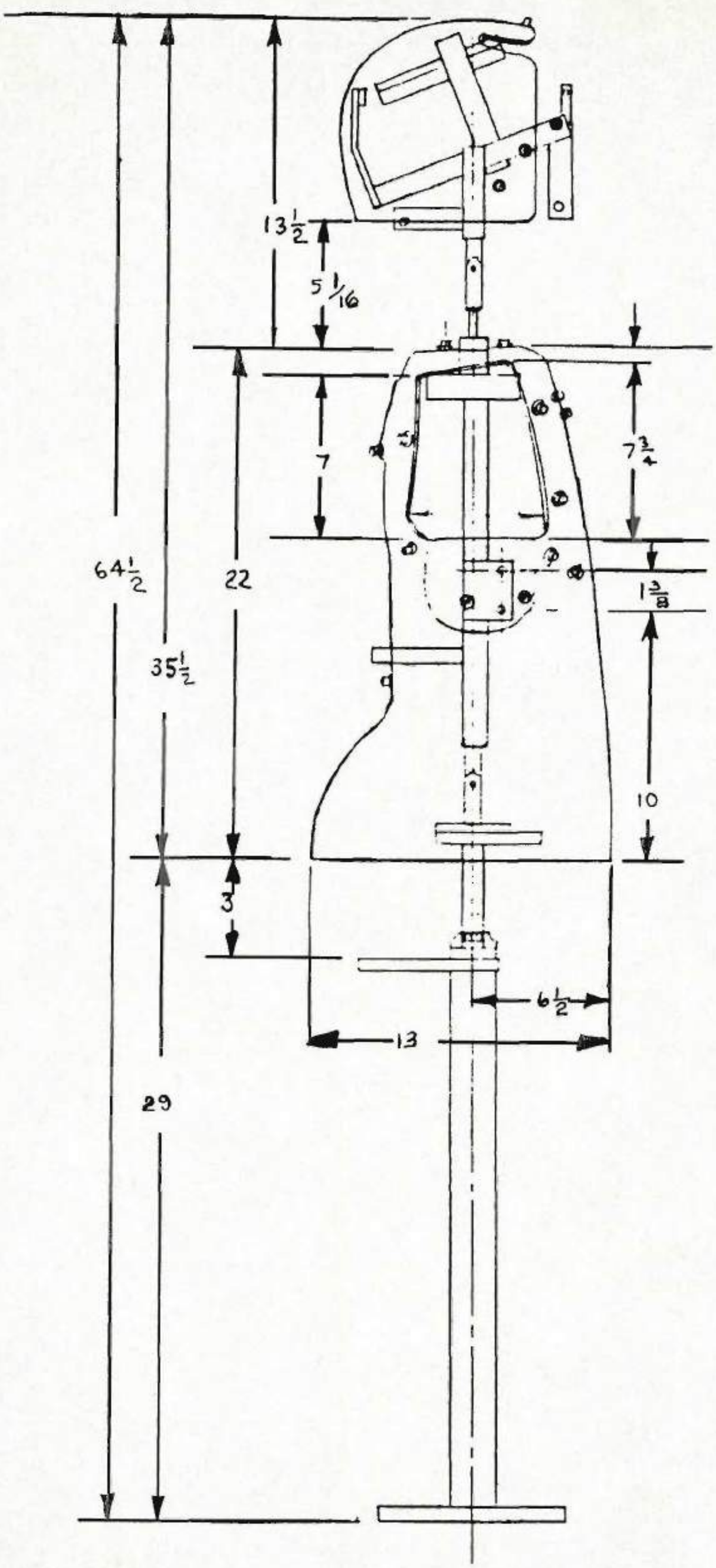


Side View

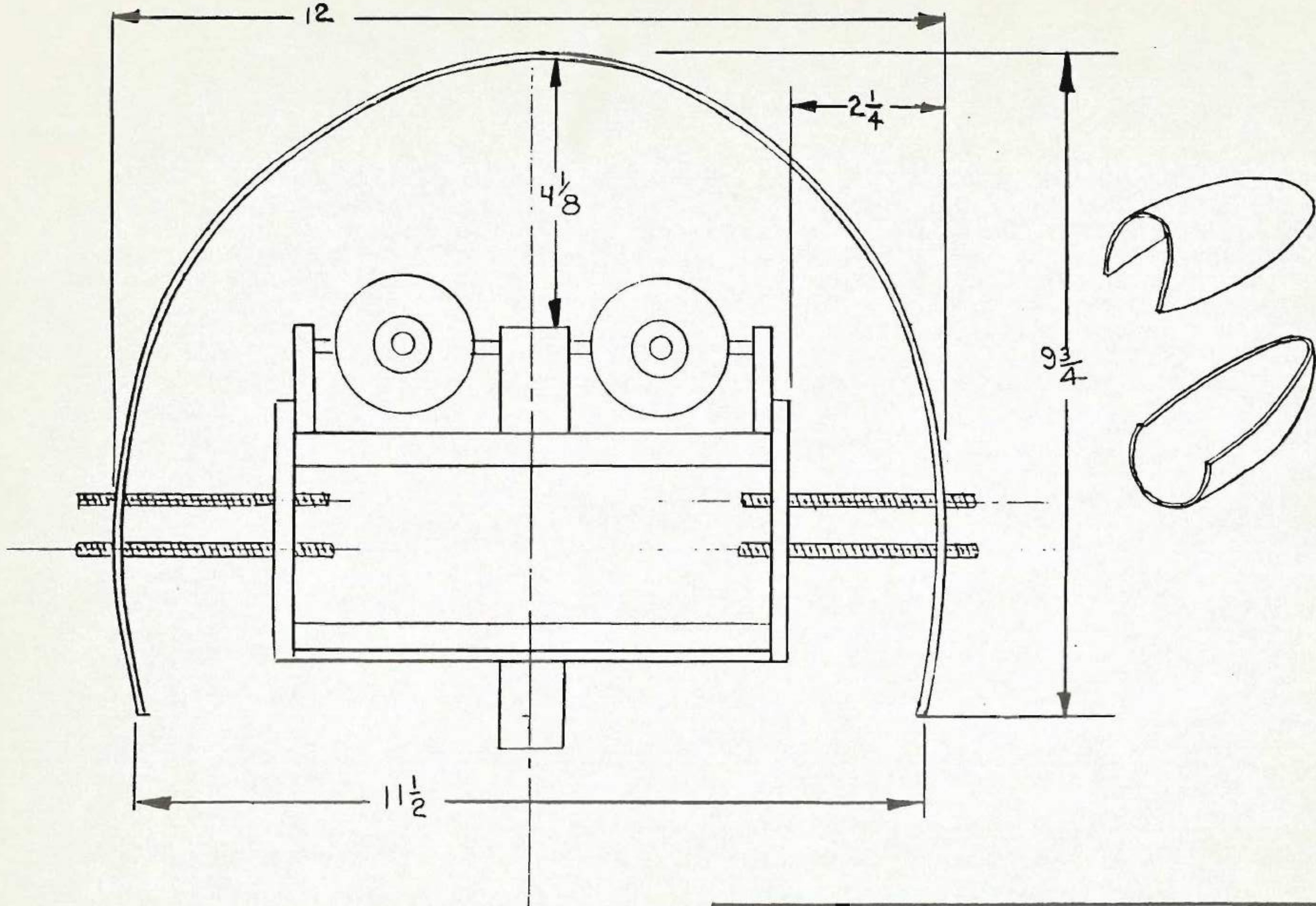
SCALE: 1/2" = 1	APPROVED BY	DRAWN BY carl R
DATE: 12-8-81		
MITZI'S Head-SKULL		
19440		DRAWING NUMBER 41N



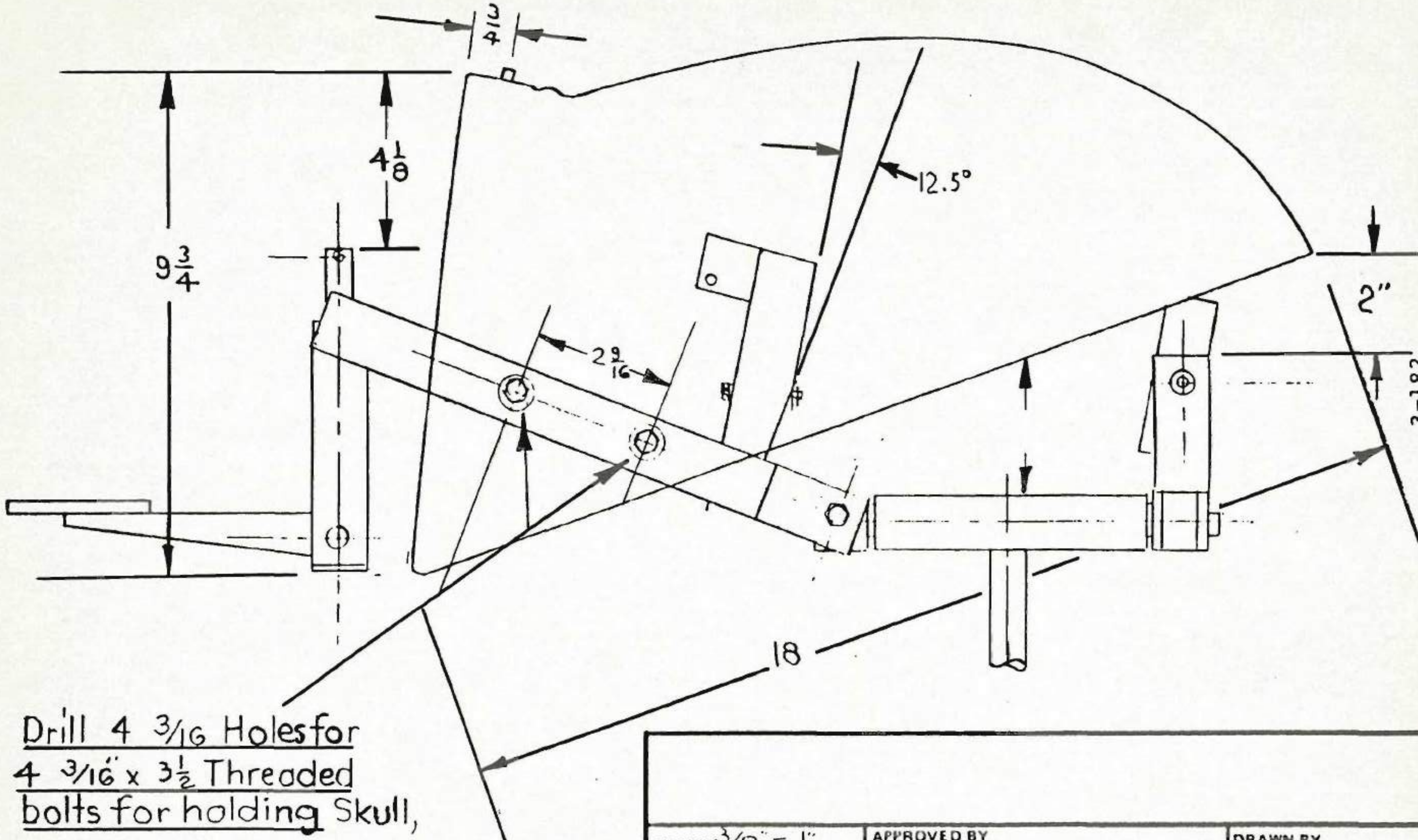
DATE 2-1-82 DRAWN by C.R	MITZI- FRONT VIEW DRAWING # 41 P



DATE 2-1-82 DRAWN by C R	MITZI - R SIDE - DIMNS. Scale 1/16=1" DRAWING 410

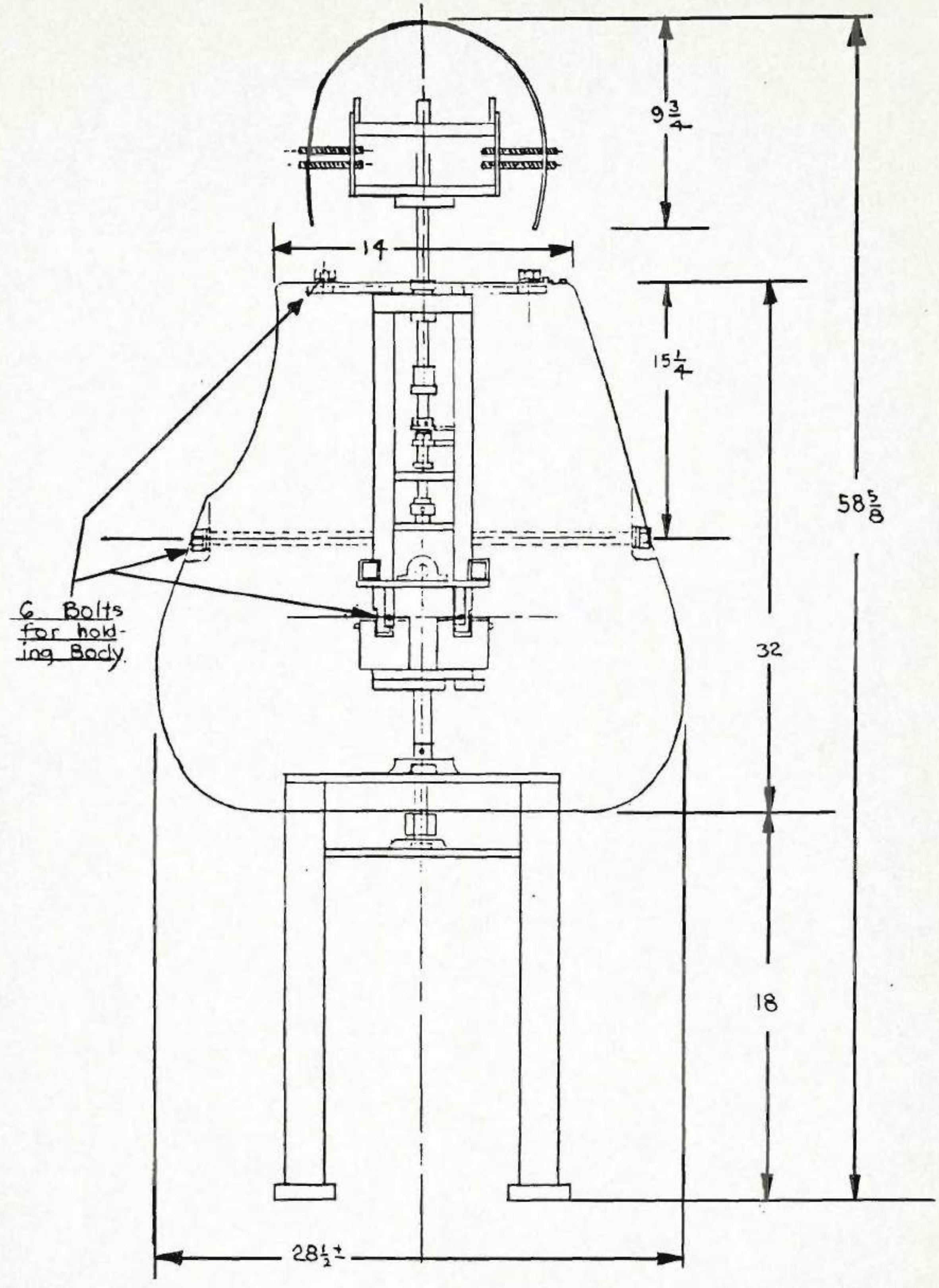


SCALE ½"=1" DATE 9-29-82 DRAWN by C.R	BILLY BOB'S SKULL 25 Mm

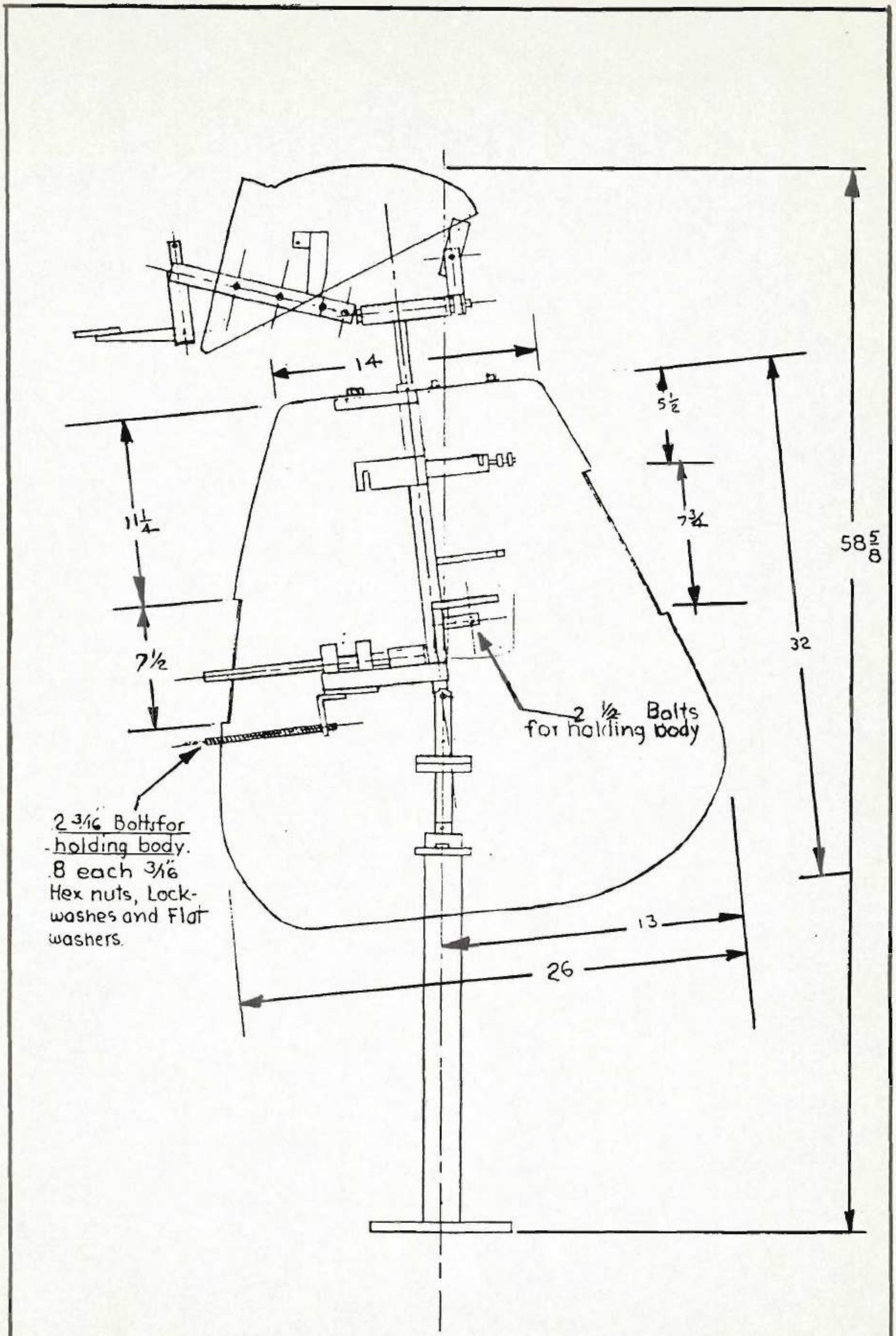


Drill 4 3/16 Holes for 4 3/16" x 3 1/2 Threaded bolts for holding Skull, With 16 nuts, 16 Flat washers and 16 lock washers 3/16" each.

SCALE: 3/8" = 1" DATE: 2-2-82	APPROVED BY	DRAWN BY Carl R
Billy Bob's Skull		
SHEET 2		DRAWING NUMBER 5L

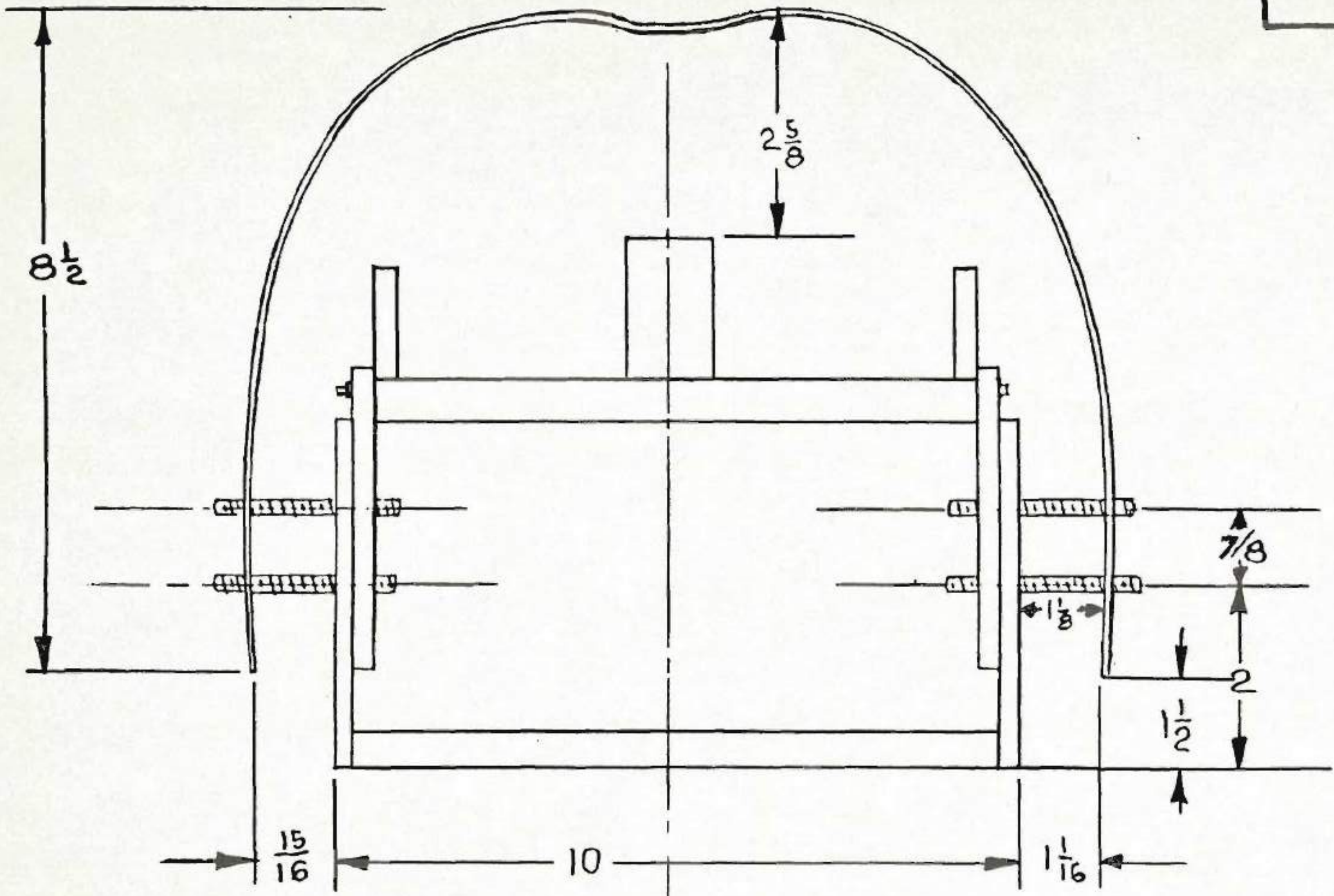


DATE 2-15-82	BILLYBOB FRONT VIEW
DRAWN by C.R.	Scale 3/16=1" DRAWING # 35N



DATE 2-8-82
DRAWN by C.R.

BILLY BOB-LEFT SIDE
3/16" = 1"
DRAWING # 35m

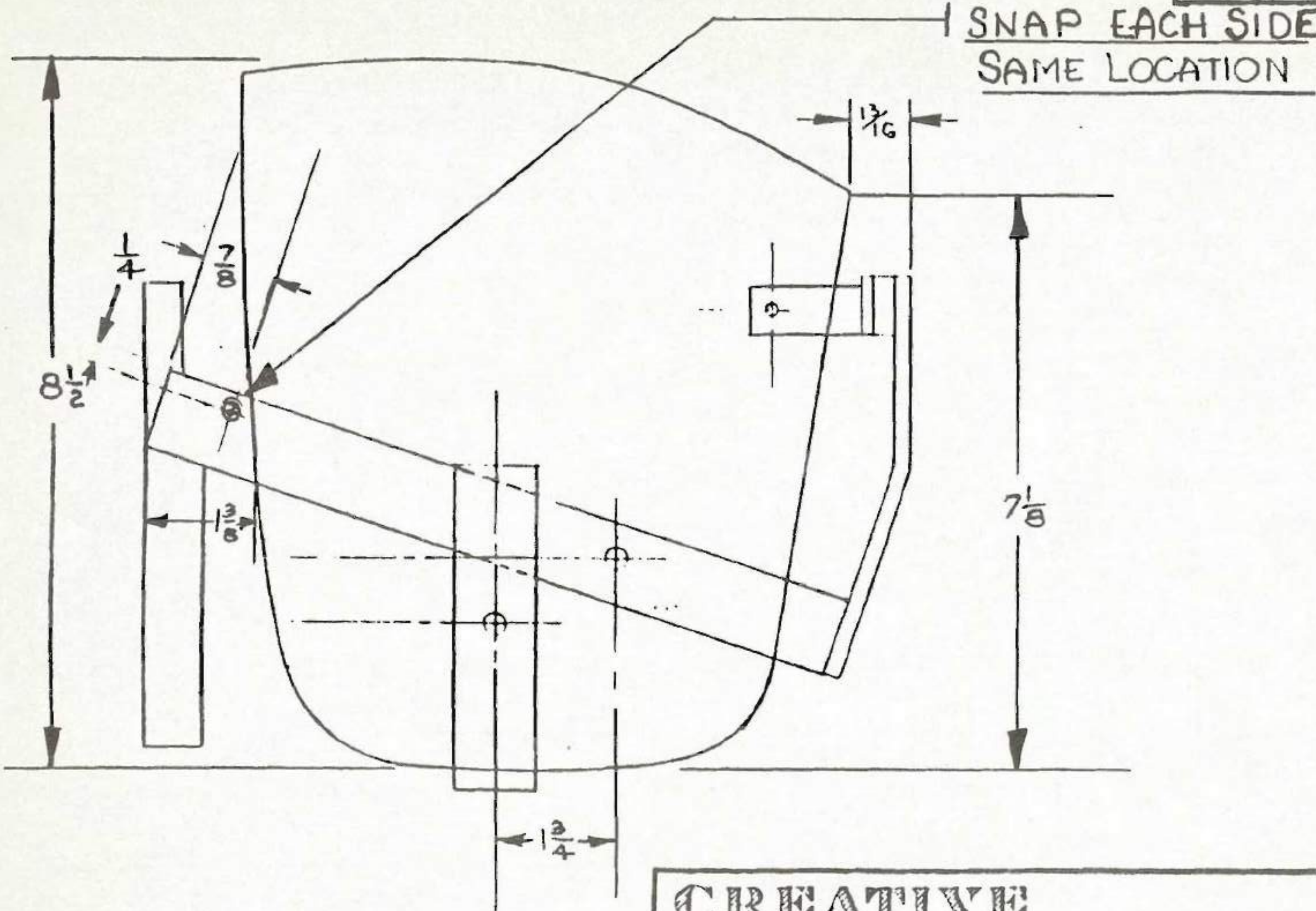


STOCK	MAT'L.

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REVISIONS						
REV.	DATE	BY	SCALE: 1/2 =1	APPROVED BY / DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	DRAWN BY C R
✓	10/21	C.E.	DATE: 2-15 82			CHK'D. BY
			ITEM: LOONEY BIRD'S SKULL F-VIEW			TOLERANCES FRACT'L. .020 DECIMAL .xx ± .010 .xxx ± .005
			DESCRIPTION:			DRAWING NUMBER 3G



3-186

STOCK	MAT'L.

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REVISIONS		
REV.	DATE	BY

SCALE: 1/2" = 1

DATE: 10-20-82

APPROVED BY | DATE

DEBURR AND BREAK ALL SHARP CORNERS ± .010

DRAWN BY C. Rutter.

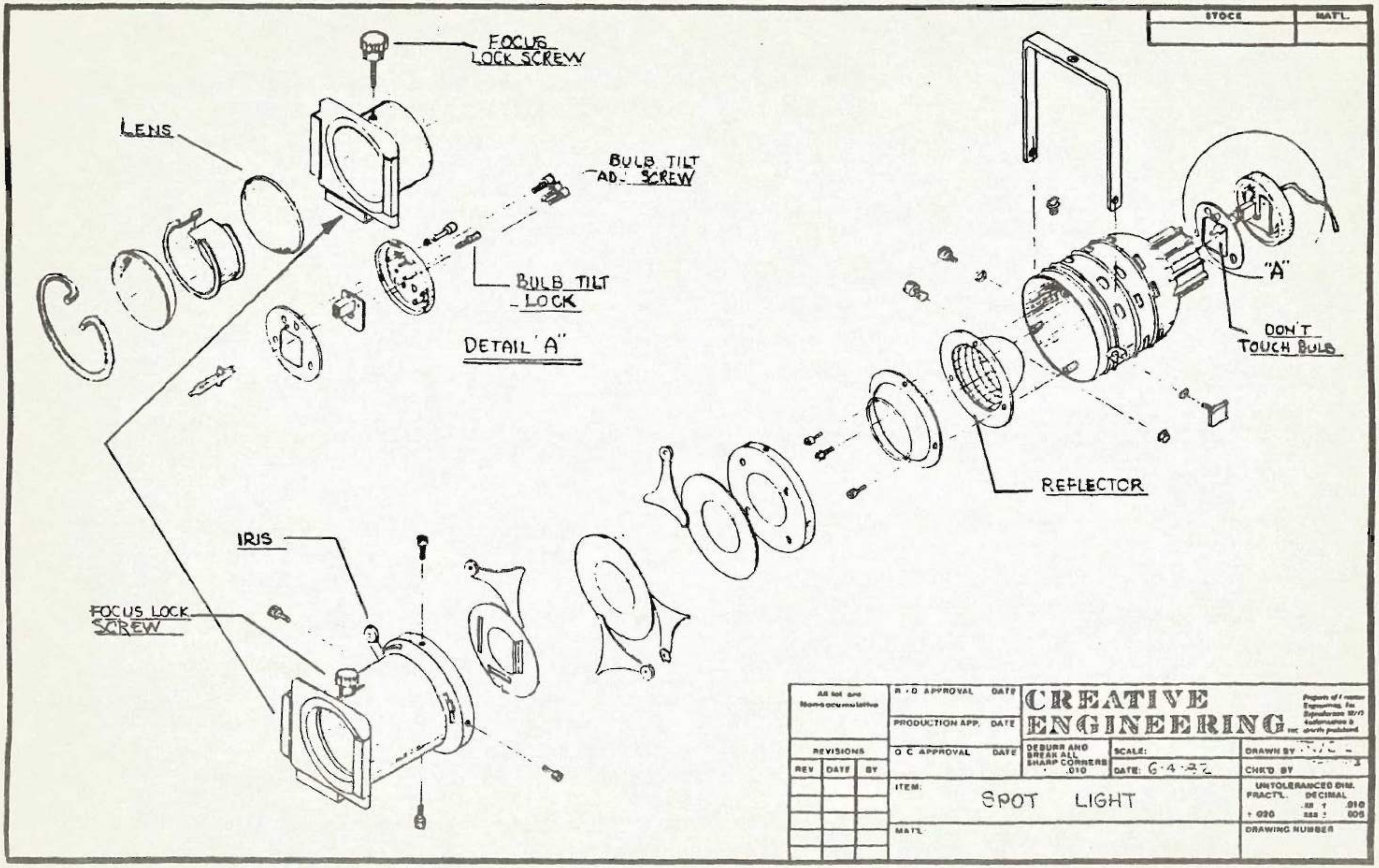
CHK'D. BY

ITEM: LOONEY'S BIRDS SKULL

TOLERANCES
FRACT'L. .020
DECIMAL .xx ± .010 .xxx ± .005

DESCRIPTION: SHEET 1

DRAWING NUMBER 7-1


FOCUS
LOCK SCREW
LENS
BULB TILT
ADJ. SCREW
BULB TILT
LOCK
DETAIL "A"
"A"
DON'T
TOUCH BULB
REFLECTOR
IRIS
FOCUS LOCK
SCREW
STOCK
MAT'L.
R.D APPROVAL DATE
PRODUCTION APP. DATE
Q C APPROVAL DATE
REVISIONS
REV DATE BY
CREATIVE
ENGINEERING INC.
DEBURR AND
BREAK ALL
SHARP CORNERS
.010
SCALE:
DATE: 6-4-82
DRAWN BY
CHK'D BY
ITEM:
SPOT LIGHT
UNTOLERANCED DIM.
FRACT'L. DECIMAL
± .020 .XX ± .010
.XXX ± .005
MAT'L
DRAWING NUMBER

Table

Of

Contents

Electronic Trouble-Shooting Guide

Introduction To Electronic Sections

The Electronics portion of this manual is divided into two major sections. The first section is meant to be a step by step procedure for trouble-shooting techniques. The second section is a more detailed account of repairs and instructions on how to perform the necessary tests and procedures. The second section also contains the drawings, charts, and schematics that are referenced throughout the trouble-shooting guide.

The trouble-shooting guide is meant to be read in descending order until you find the exact cause of the problem and make the necessary corrections. Find the symptom that best describes the problem you are experiencing. Begin in the left column with the first step and move down the numbered steps for each procedure. The right column will give you the location for more detailed information, as well as anticipated results. If the problem is not corrected after each step is completed, move to the next step.

The Electronics trouble-shooting approach can be handled nearly the same as the Mechanical guide; you must sectionalize the problem and isolate it to the specific area. The symptoms listed in our guide may not be stated in the exact terms that you would describe the problem, however, you should be able to recognize a similar description. Follow the trouble-shooting guide carefully. It has been developed from much experience and should save you a lot of time and expense if followed properly.

***************** A. Audio Problems **********************

Symptom: No Sound

Procedure	Results
1. Check to be sure power is on to all equipment in Audio Rack, see drawing on page 5-016.	See power up procedures in Mech. Part I, page 1-003 and pages 5-002 and 5-003 in Electronics.
2. Start Tape Deck at controller buttons. Check channels 1 & 2 VU meters for movement.	If meters do not move, Deck or Tape may be at fault, see Tape Deck Manual, or replace tape.
3. Check meters on amps.	If no movement - go to step 7.
4. Check fuses on speaker panel.	If fuses are blown - replace. See pages 5-003 and 5-015.
5. Check impedance on speakers.	Replace speakers if necessary
6. Pull out cables from channels 1 & 2 of the DBX box output and plug them into channels 1 & 2 of the Tape Deck output.	If sound comes out - DBX is bad - replace it or see sections on DBX - pages 5-003 and 5-024.
7. Check gain on equalizer.	See pages 5-002 and 5-016.
8. Take a reading on the output of the equalizer from channels 1 & 2, with your O'scope.	If no output is seen on the O'scope - equalizer is bad replace it, see pages 5-002 and 5-017 or 5-018.
9. Check fuses on rear of amplifier.	Replace any blown fuses and if there is still no output, replace amplifier.
10. Check cable connections and wiring.	See pages 5-002 and 5-015.

Symptom: One channel out

Procedure	Result
1. With the tape running, look at the meters on the front of the Deck, for channels 1 & 2.	If meters in question do not move, see Manual on Tape Deck.

Symptom: One channel out — Cont.

Procedure	Result
2. Check meters on Amps.	If meters do not move, go to step 7.
3. Pull out the cable from the channel in question (1 or 2); switch the cables around plugging them back into the Deck.	Problem does not travel with the cable when exchanged - deck is bad or tape, repair or replace the bad part.
4. Exchange input cables on DBX.	If problem does not move with cable - then DBX is at fault, replace it or see section on DBX, pages 5-003 and 5-019 thru 5-025.
5. Check fuse on speaker panel.	Replace if necessary.
6. Check speaker.	Replace if necessary see page 5-003.
7. Check fuses on rear of amps.	Replace any blown fuses and if there is still no output, replace amp/amps.

Symptom: Poor or Distorted Audio in both Channels

Procedure	Result
1. Clean tape heads and Demagnetize.	See Tape Deck Manual.
2. Pull out cables from channels 1 & 2 of the DBX box output and plug them into channels 1 & 2 of the Tape Deck output.	If sound comes out - DBX is bad - replace it or see section on DBX - pages 5-019 thru 5-025, and 5-003.
3. Check gain and settings of equalizer.	Reset or replace Equalizer. See pages 5-002 and 5-017 or 5-018.
4. Check speakers.	Replace if necessary, pages 5-003 and 5-015.
5. Check wiring.	See pages 5-002 and 5-015.

Symptom: Poor or Distorted Audio in one channel only

Procedure	Result
1. Clean tape heads and Demagnetize.	See Tape Deck Manual.
2. Exchange cables on Deck	If problem does not move with cable,the Tape Deck is at fault, repair or replace it.
3. Exchange cables from channels 1 & 2 of the DBX box output.	If sound comes out clear - DBX is bad replace it or see section on DBX pages 5-003 and 5-019 thru 5-025.
4. Exchange cables on Equalizer.	Reset and check gain or replace.
5. Check speakers.	Replace if necessary, page 5-003.
6. Check amplifiers.	See manual or replace.

****************** B. Controller Problems ********************

Symptom: No stop, and / or no rewind

Procedure	Result
1. Manually override to start the Show from the Dual P.C. Mount controls.	
2. Check channel 4 VU meter for movement.	If no movement, replace tape and or deck, see Manual on Tape Deck.
3. Pin up function on Long Driver Board.	If function works go to steps 8-10, or see page 5-045.
4. Test 5 volts on Show Control Board	If voltage is not correct, check power supply, pages 5-004 and 5-047.
5. Take a reading with your O'scope on the input of of finger contact of Show Controller.	See pages 5-004 and 5-047.
6. Remove Show Control Board and jumper to ground, the output pin - function, in question.	If the function works replace Show Control Board. See page 5-004 and 5-047.
7. Unplug remote cables from J-13 Interface and bridge the pins to activate the function.	Repair or replace remote cables, see wiring charts on pages 5-035 thru 5-036 and 5-045.
8. Exchange Long Driver Bd.	Repair or replace Long Driver Board, see material on Long Driver Board, see pages 5-005 and 5-026.
9. Exchange Playback Bd.	Replace the board or repair wiring only, see pages 5-006 and 5-029, also 5-032.
10. Check wave shaper in DBX	See pages 5-003 and 5-019 thru 5-025.

Symptom: Does not switch from normal to special Deck

Procedure	Result
1. Push stop - special - and play buttons on Dual P.C.	If it works, check manager control cable - repair or replace, see pages 5-047 and 5-049, also 5-069.
2. Remove House Light Dimmer from Dual P.C. Mount and ground collector of Q-1 trans. on Show Control Board.	If it switches, replace Show Control Board.
3. Remove DBX cable from rear of DBX box, take a reading between pins 1-2, while collector is grounded, there should be 25 volts.	If there is 25 volts between the pins - see DBX trouble-shooting on pages 5-003 and 5-019 thru 5-025.

Symptoms: Show rewinds when it shouldn't- stops where it shouldn't - Erratic lighting - section o lights missing - Irregular movements

Procedures	Results
1. Manually reset the controller by pushing stop button on Dual P.C. Mount .	
2. Manually switch to other Deck and new Show.	Problem is not seen in other Deck - opposite Deck is bad replace it, or see Tape Deck manual.
3. Identify visually, which Characters are affected; those in top drawer or bottom drawer.	See page 5-005.
4. Check 25 volts and 5 volt power supplies.	Repair or replace if necessary See pages 5-004 and 5-005, also 5-031.
5. Switch DBX cables.	See detailed guide, pages 5-003 and 5-019 thru 5-025.
6. Check wiring and connectors in and out of DBX.	See pages 5-003 and 5-019 thru 5-025.
7. Exchange Playback Board from other drawer.	Adjust 3/4 bit or replace, see pages 5-006 and 5-032.

Symptom: Show does not play automatically.

Procedure	Result
1. Pin up the output on Show Control Board.	If it works, replace the Show Control Board, see pages 5-004 and 5-047.
2. Check Dual P.C. Mount and wiring.	Repair, see pages 5-004 and 5-047, also 5-049.

Symptoms: Special deck rewinds when it shouldn't - plays when it shouldn't - stops where it shouldn't

Procedures	Results
1. Check 25 volts and 5v. power supplies.	Repair or replace see pages 5-004 and 5-005, also 5-030.
2. Follow same procedures as in preceding symptom.	

************* C. Character or Props Movement Problem ************

Symptom: Individual movements not working

Procedure	Result
1. Manually override valve at valve bank.	If it doesn't move - see Mechanical Part 3, pages 3-004
2. Pin up bit on Long Driver Board.	See bit chart on pages 5-005 and 5-006, 5-037 - 5-046.
3. Check the 25 volts on collector leg of trans.	If there is not 25 volts on transistor, go to step 6.
4. Exchange Long Driver Board.	Repair or replace - see pages 5-005 and 5-006.
5. Exchange Playback Board.	Adjust 3/4 bit, repair wiring only or replace, see page 5-006.
6. Unplug character cable from the Tunnel and read between 23/24 and the proper pin.	If no 25v. - see charts on Tunnel wiring and make repairs See pages 5-006 and 5-037 thru 5-046, also 5-033.
7. Unplug cable at valve bank and check for voltage between proper pin number and 23/24.	Repair or replace cable, see pages 5-006 and 5-007.
8. Check valve bank wiring harness.	Repair or replace - see pages 5-006, 5-037 - 5-046, also 5-050 thru 5-052, and 5-056.

Symptom: Four or Eight Bits (movements) not working

Procedure	Result
1. Exchange Long Driver Board.	Repair or replace the board. See pages 5-006 and 5-026.
2. Exchange Playback Board	Repair wiring only, or replace See pages 5-006 and 5-029, 5-032.
3. Check Playback Board wiring.	Make repairs, see pages 5-006 and 5-029, also 5-032.

Symptom: Multiple bits (movements), missing on different Boards.

Procedure	Result
1. Exchange Playback Board	Repair or replace the board, see pages 5-006 and 5-029, also 5-032.
2. Check Playback board wiring.	Repair wiring, see pages 5-006 and 5-029, also 5-032.
3. Refer to Controller or Audio Problems.	

************** D. Lighting Problems - Organ and Sign ************

Symptom: All lights out

Procedure	Result
1. Pin up the bit on the Long Driver Board.	Find the bit from the bit chart, see pages 5-005 and, 5-006, also 5-026 and 5-037 thru 5-046.
2. Check to see if you have 25 volts on the collector leg of the trans.	If you have the 25v. and you could not activate it when you pinned up the bit, go to step 4.
3. Exchange Long Driver bd.	Repair or replace Long Dr. Bd. see pages 5-005 and 5-006, also 5-026.
4. Check the fuse, 110v. A.C. lines, cord , outlet, breaker.	See page 5-008 for more details.
5. Check voltage on voltage regulator on the Organ and Sign Driver Boards.	See pages 5-008 and 5-059 thru 5-062.
6. Check A.C. voltage --- (Be careful) on 3 pin terminal, between pins 1 and 3.	If voltage is good on voltage regulator, and A.C. is good - replace driver board. See pages 5-008, 5-057 thru 5-062.
7. Check wiring, connectors and cables.	Repair or replace if needed. See pages 5-054 and 5-057 thru 5-062.

Symptom: Lights on all the time

Procedure	Result
1. Power down the controller. from the wall.	If lights go out, exchange Long Driver Bd. for bits in question, see pages 5-037 thru 5-046.
2. Replace 'opto' & Triac or trans. on driver board of Organ or Sign.	See pages 5-008 and 5-057 5-062.
3. If problem still exists, check cables and wiring.	See pages 5-055 and 5-057 thru 5-062.

Symptoms: A set of lights out; (red, orange, blue, green, strobe, or leg lights)

Procedures	Results
1. Pin up the bit on the Long Driver Board.	Find the bit from the bit chart, see pages 5-005 and 5-037 thru 5-046.
2. Check the voltage on trans. leg of Long Driver Board.	See page 5-005.
3. Switch Long Driver Bd.	Repair or replace - see page 5-026 and 5-005.
4. Bridge 'opto' on Organ and Sign Board.	See pages 5-008 and 5-055, also 5-057 thru 5-062.
5. Check leg of trans. or Triac on Board.	If 25v. is switching, but it doesn't work, repair or replace driver board, see pages 5-008 and 5-057 thru 5-062.
6. Check cables, connectors and wiring.	See pages 5-008 and 5-054 thru 5-062.

***** D. Lighting Problems cont. - Spots and Flood Lights *******

Symptom: Lights off all the time - (RAF-100's)

Procedure	Result
1. Pin up bit on Long Driver Board.	Find bit on bit chart, see pages 5-005, 5-037 - 5-046.
2. Check the voltage on trans. leg of Long Driver Board.	If good go to step 4.
3. Test the voltage between terminal #3 of the light Control Module and chassis of RAF-100 box.	See section on RAF-100 box, pages 5-008 thru 5-009 and 5-074, also 5-081.
4. (Jumper white A.C. terminal to corresponding yellow one in RAF-100 box.) <u>DANGER</u> See detailed account.	See pages, 5-008 thru 5-009. If light turns on replace Triac and CEI Module Board. See also pages 5-074, 5-081.

Symptom: Lights on all the time (RAF 100's)

Procedure	Result
1. Unplug the controller from the wall.	If lights go out, exchange the Long Driver Bd. for bits in question, see pages 5-005 and 5-037 thru 5-046.
2. Exchange Light Module Bd. and Triac with a new one from the end of the RAF 100 box, spares.	See page 5-081.
3. If problem still exists, check cables and wiring.	See page 5-056 also 5-073 thru 5-074 and 5-081.

Symptom: Lights off all the time - (CC Panel)

Procedure	Result
1. Pin up bit on Long Driver Board.	Find bit on bit chart, pages 5-005 thru 5-006. Exchange Lg. Dr. Bd. if it works.
2. Check the voltage on trans. leg of Long Driver Board.	If no voltage is present go step 6.

Symptom: Lights off all the time - (CC Panel) Cont.

Procedure	Result
3. Check A.C. power to box and breakers - BE CAREFUL !	Reset or refer to Electrician See pages 5-009 and 5-074.
4. Jump pin numbers 4-5 on 'opto'.	If no lights replace 'opto' and Triac.
5. Read 5v. on power supply of CC Panel driver board.	Repair or replace board, see pages 5-009 and 5-074.
6. Check wiring, connector, or cable.	Repair or replace, see pages 5-052 thru 5-053, and 5-065 thru 5-066.

Symptom: Lights on all the time (CC Panel)

Procedure	Result
1. Unplug the controller from the wall.	If lights go out, exchange the Long Driver Bd. for bits in question, see pages 5-005 and 5-037 thru 5-046.
2. Replace the 'opto' and or Triac in the C C Panel.	See pages 5-066 and 5-081.
3. If problem still exists, check cables and wiring.	See pages 5-026 and 5-056, also 5-052 thru 5-053 and 5-065 thru 5-074.

Symptom: No Houselights

Procedure	Result
1. Reset the show manually by pushing the buttons on the Dual P.C. Mount.	
2. Check A.C. Monitor to be sure it is plugged in and cable is connected.	See page 5-009.
3. Flip the switch on the House Light Dimmer Bd.	Lights do not come on bright - go to Trouble-Shooting Light Box, see pages 5-008 thru 5-009 and 5-066.
4. Test voltage on pin #1 of House Light Dimmer Bd.	If no 5 volts - trace wiring back thru Dual P.C. Mount and Tunnel, back to the power supply. Repair or replace if necessary. See detailed account in pages 5-008 and 5-009.
5. Check A.C. Monitor output to pin #5 on House Light Dimmer Board for 12.5 volts A.C. 1/2 wave.	See pages 5-009 and 5-063, also 5-075.
6. Trace the Signal back to the A.C. Monitor.	Repair if broken or replace.
7. Check voltage on Q3 trans. of House Light Dimmer Board.	See pages 5-009 and 5-064.

Symptom: Lights always dim

Procedure	Result
1. Adjust 'pots' of House Light Dimmer Board.	See schematic and instructions Pages 5-009 and 5-064, or replace.
2. Take a reading on pin #3 with your O'scope and manually issue a stop and a play from the Dual P.C. Mount buttons.	Signal doesn't switch - test output from Show Control Bd. Repair or replace, see pages 5-004 and 5-047.

Symptom: Lights always dim — Cont.

Procedure	Result
3. Pin up the #3 pin of the of the House Light Dimmer Board to ground - first remove Show Control Board or it may be damaged.	Replace Show Control Board.

Symptom: Lights always bright.

Procedure	Result
1. Check the override switch on the House Light Dimmer Board.	Reset it in normal position.
2. Verify the operation of the background Music Mute by issuing a manual stop and play.	If background music mutes but lights don't dim - replace Q3 on the House Light Dimmer Bd. If background music does not mute - replace Show Control Board. See page 5-063.

Symptom: Erratic Lighting - flickering

Procedure	Result
1. Check the A.C. voltage on pin #5 of House Light Dimmer Board for 12.5 v. A.C. 1/2 wave.	Repair or replace A.C. Monitor see pages 5-009 and 5-064, also 5-075.
2. Check Q3 trans. collector leg for voltage fluctuation	If voltage fluctuates, replace Q3.

************* E. Drapery Problems - Post 1/83 Batch *************

Symptoms: Draperies will not open or will not close.

Procedure	Result
1. Manually override the control with the switch located on the stage.	If it does not activate, move to step #3.
2. Check the A.C. voltage on the terminals marked X and N, in the RAF 100 Box. (DANGER LIVE VOLTAGE)	If you can not get a reading on the A.C. voltage, move to step #4.
3. Check the Limit Switches, relays,and motor.	See details on pages 5-010 and 5-077, also 5-079.
4. Check disconnect.	
5. Check thru the circuit by reading continuity with the power off. Check the disconnect, overload protector,timer relay,and stop push button.	Repair or replace any components as necessary, see pages 5-010 and 5-077, also 5-079.
6. Pin up the bit on the Long Driver Board.	See bit chart, pages 5-026 and 5-037 thru 5-046.
7. Exchange Long Driver Board.	Repair or replace Long Dr. Bd. See page 5-005.
8. Read output on Drapery Control Board.	See schematic - If voltage does not switch from high to low, replace Drapery Control Board. See pages 5-010 and 5-080.
9. Test the voltage between terminal #3 of the light Control Module and chassis of RAF-100 box.	See section on RAF-100 box, or CC Panel pages 5-008 thru 5-009 and 5-072, also 5-081.
10. Jumper the black terminal #1 to the chassis of the RAF 100 box with an insulated jumper to Control Module and chassis of RAF-100 box.	If this works the Draperies Replace the Triac and Module Board with one of the spares. See pages 5-008 and 5-009, also 5-072 and 5-081.

************* E. Drapery Problems - Pre 1/83 Batch *************

Symptom: Draperies do not open or do not close

Procedure	Result
1. Follow the same procedure as for the Post 1/83 batch, with the exception of step #2 - where the earlier motor controls have terminals marked, N & L1, instead of X & N.	See page 5-078.

****************** F. Miscellaneous Problems ******************

Symptom: Background Music will not mute or on all the time

Procedure	Result
1. Jumper between red and black binder post of the DBX box.	If it works, check the wiring from the DBX Box back to the background music source. See pages 5-024 and 5-011, also 5-069.
2. Unplug the DBX Tape Select cable from the rear of the DBX box and read voltage across pins 2 - 3 of the molex connector on the box.	If it switches from 25 volts D.C. with the show tape operating and 0 volts when Houselights go bright, DBX is source of problem - see pages 5-003 and 5-019 thru 5-024.

Symptom: Dual Pressure Manifold does not operate

Procedure	Result
1. Manually override Dual Pressure Manifold with switch located on the manifold.	If it does not work, see Mechanical section pages 2-004.
2. Pin up bit 40 in the top drawer or bit 60 in the bottom drawer.	See bit chart pages 5-037 thru 5-046.
3. Take a reading on the output of the gray wire tying the top drawer to the bottom drawer.	Repair or replace Long Driver Board, see pages 5-005 and 5-011, also 5-082.

Table of Contents

Electronic Repair Section

A. Audio Problems

General Information

In this section we will cover problems relating to audio. It is essential and a real time saver if you begin any procedures for trouble-shooting the Controller and Audio Rack, with a known good quality tape. Another good habit to get into is to start any trouble-shooting procedures by checking the basics of the system, like A. C. power cords, cables and wiring.

Isolating the exact location of the cause of these types of problems can be simplified by the dual nature of the Electronic System. The Audio equipment can be considered like a stereo system with two independent channels operating simultaneously. Therefore we can literally switch channels and isolate a problem. We can further identify the particular cause of the problem by by-passing individual pieces of the Audio System and tracing the cause through the process of elimination.

Audio problems are perhaps easier to localize than most data related problems. A common cause or problem may effect both data and audio. Remember to start with the simplest and work toward the complex. Start by cleaning the head and tape alignment (see manual provided with deck). Move down the procedure to cables and power, even speaker wires. Try all the cables and wiring before you replace any components; see Power Up Procedures on page 1-003.

Equalizer

Take a reading on the output of the Equalizer for the channel or channels in question. Use your O'scope to read the signal. If you had a signal coming out of the DBX Box and you do not have a signal coming out of the Equalizer, then check the switch, gain, and other wires leading in and out of the Equalizer. If that is not the problem, the Equalizer is bad, replace it with a new one. If for some reason you need to reset the equalization, please refer to the diagrams that show the settings for the room size of 2000 ft. or less, and the diagram for 2000 ft. or more, see pages 5-017 and 5-018.

Amplifier

Check the amplifiers for output by looking at the meters. <u>Warning, do not change cables on the amps or other audio equipment with the volume up.</u> Switch the cables around to determine which channel is bad or if the speakers are bad, providing you have an output from the amps.

Make any necessary corrections or replace the amps if you have determined that they are bad. It is unlikely that both amps will go bad at the same time so trouble-shooting them should be limited to exchanging channels.

Speakers

Check the fuses for the speakers and impedance on the speakers. If you find it necessary to replace any blown fuses, be sure the replacements are 2 amp fast blow fuses, or 3 amp at the greatest. Warning - Placing an over - rated fuse will possibly cause a fire.

DBX Box

Equipment Required
Oscilloscope
Frequency generator
Millivolt meter

1. Remove the box from the audio rack and open it up. With the power plugged in, check the Power Supply board for +5v, -5v, +12v, -12v, outputs, see pages 5-019 thru 5-025. Check variable outputs of the Power supply for -12v to +12v swing. Repair or replace if necessary.

2. Audio adjust -(not needed for data trouble-shooting)
Connect the signal generator to track 1 NML in, and apply -10DBV at 1khz, see pages 5-019 thru 5-025. Connect an A.C. Millivolt meter to track 1 output. Adjust potentiometer on the power supply board and track 1 of the DBX card for -10DBV output. Repeat the procedure for track 2. Note: There is interaction between tracks 1 and 2 via the power supply potentiometer. So, repeat this step several times to be sure that it is balanced between the two. If you are unable to do this, replace the DBX boards in question. One board may load the other, so unplug them or exchange cables to verify it exactly.

3. Data adjust - Connect the signal generator to track 3 NML in, and apply a -10DBV at 2.25khz, see pages 5-019 thru 5-024. Connect a millivolt meter and O'scope to track 3 output. On the millivolt meter obtain a reading of +7DBV. Adjust the potentiometer on the DBX Tape Select Board track 3 to a 1/2 bit, or a 50% duty cycle on the O'scope display. Repeat this step for track 4 normal input. The inability to find these readings identifies the board as a failure, therefore replace it with a new one.

4. If steps 1-3 prove unsuccessful, check the wiring and connectors. Phono jacks may loosen, Molex pins become unseated, and wires get broken. Repair or replace if necessary.

5. Once you have verified that the outputs from the DBX are good, check your cables and connectors back to the controller. Unplug the data cable and see if it has a data output at the controller. If not, then replace it. Continue to trace the signal through the wiring, back across the Tunnel and into the Playback Board. It is unlikely that both Playback Boards will go bad at the same time, so exchange the boards to verify their quality. If one is thought to be bad, try adjusting the 3/4 bit. See page 5-006.

B. Controller Problems

General Information

If possible, try to isolate the problem to one drawer or another, by determining which characters are responding incorrectly. This will allow you to exchange the equipment in the drawers to facilitate locating the exact problem.

Show Control Board

Locate the bit on the Long Driver Board that activates the control in question and attach your O'scope probe to the collector leg of the transistor, see the bit chart (pages 5-037 thru 5-064) for more information. Now, back the tape up to just before the control bit is activated and then run it forward again as you watch the O'scope, to see if the transistor switches the voltage from 5 volts D.C. high to low. If it does not switch then exchange the driver board with another one and see if that takes care of the problem. If that does solve it, then replace the driver board or repair it.

Take a reading on the finger contacts of the Show Control Board where that control is found. Show Control Board Finger Contact Pin Outs:

Deck 1 Function	Pin	Deck 2 Function	Pin
Stop	E	Stop	L
Play	D	Play	K
Rewind	C	Rewind	J

The voltage should switch from high to low as the signal is processed. If it does not change, then the board may be bad, so pull the board out of the card holder. Now, take a jumper and ground one end as you touch the other end to the pin, and see if that causes it to function. If it works, then the board is bad . If that does not work then trace the signal back from the Dual P.C. mount to the Tunnel thru the wiring and out the Tunnel, all the way back to the Remote cables. Then you can unplug the Remote cable from the J13 Interface and bridge the pins to see if the cable is bad. You may also exchange the cables and see if that takes care of it. You may want to go back and retrace some of your steps if the problem has not been isolated.

Power Supplies

As a matter of routine trouble-shooting procedures you should check your power supplies early in your procedure. Examine the 5v. and 25v. lights on the Playback Boards. The top LED is for 25 volts and the middle one is for the 5 volts. The bottom LED indicates the sync. Don't forget however, that the LED's for the voltage do not necessarily indicate exact voltage but rather just the presence of some voltage, so it would be a good idea to double

check the reading on voltage if you suspect that they are your source of the problem.

Read the voltage on the red wire in the center of one of the driver boards with your 'scope. You may also take the large 15 pin molex off the rear of the drawer and read the pins for the voltage without a load. If you find that the problem lies in the power supplies either repair or replace it with a new one, see pages 5-030 and 5-031.

A peculiar problem that may lead you astray has to do with power supply failure. It may exhibit itself in symptoms like missing stops or not rewinding or rewinding when it's not supposed to, <u>but only when in the special deck mode.</u> If this occurs double check your voltages on your power supply, especially when it is doing this, try taking a reading on the controller power supplies and replace them if necessary. Try exchanging power cables first between bottom drawer and top drawer, they are interchangeable.

C. Character or Props movement problem

General Information

First let us define what we mean by a movement problem. When a character or prop movement stays on all the time, or off all the time, that is a movement problem. It can either be single movements or multiple ones that are reacting together causing this problem. In some cases, erratic behavior of movements may be considered with this section but in the majority of cases erratic movements can be attributed to either Mechanical or Art related problems, and occasionally, tape problems. Mechanical or Art should have already been eliminated and you should instead refer to the Electronics section on Controller for erratic movements.

Another visually similar problem may occur when either cables are mixed or air lines exchanged. This could happen when other repairs are being made or during routine maintenance. A movement may operate correctly but not in the right time sequence or even with the correct character. When this occurs, double check all your cables and air lines to be sure nothing has been installed incorrectly. Once you have identified the exact problem then proceed to the proper step.

Long Driver Board

Determine exactly which bit controls the movements you have in question by examining the bit chart, on pages 5-037 thru 5-064. Jumper the pin on the Long Driver Board to the chassis and observe the movement. If the movement activates, then your wire harness and cables are good. If the bit does not activate, exchange the board.

Next, check to see if you have 25v. D.C. on the collector leg of the MJE 800 transistor of the bit in question. Do you have the 25v. on the transistor leg? If you do, then the problem lies, most likely with the Solenoid.

Exchange the Long Driver Board from another slot with the one you are working on; it may not be necessary to unbolt the driver boards from the drawer but be careful not to damage the wiring

while you are doing it. You can take the board off of the support stands inside the drawer with the small bolts in the upper corners. Plug in the exchanged board and once again run the show to see if that has corrected your problem. If the problem moves with the board, then replace the Long Driver Board, see page 5-026.

Playback Board

Begin by exchanging the Playback Board with the one in the other drawer. Run the show again and if this solves the problem, then adjust the 3/4 bit. If that still does not help then move on to the next point on tracing wiring problems on the Playback Board.

Using the chart for the Playback Board pins outs, see pages 5-029 thru 5-032. Check continuity on these wires from the pins on the board to the Tunnel, as well as the 24 pin plug in connector. (Don't forget that sometimes a simple cleaning of the connector contacts may be the solution).

Adjusting 3/4 bit

Connect channel 1 of your O'scope to pin #7 of U19 for voltage adjustment. Adjust the 10k potentiometer to 2 volts. Connect channel 2 of your O'scope to test point 4 (tp4) and adjust the 50k potentiometer to 3/4 bit or 75% of the wave. Note: these two adjustments are interactive so try moving the 'pots' a couple of times to see how they affect each other before trying to set it exactly. Watch the LED to see if the light goes out when the tape is running. If you are unable to adjust the 3/4 bit return the board for replacement.

Wire harness and cable trouble-shooting

In order to find if a cable or wire harness is good, it is easier to test it with the power on. In some instances, like in actually trouble-shooting the Playback Board or Tunnel, it may be easier to take them out of the circuit and read the connections by continuity checking.

Long Driver Board Harness - Find the contact on the 24 pin connector on the output to the character and it's corresponding pin near the leg of the transistor, and check for continuity, see pages 5-037 thru 5-064. If you do not have continuity, repair the connection and retest it by jumpering the bit.

Tunnel Wiring - Check the Tunnel and see if the connector in question has 25v. coming out of the Tunnel. Unplug the cable from the Tunnel that the movement occurs in, and read the voltages on the pins between #23 - #24 and ground. If you have the 25 volts on these pins, then you must trace the wiring backward through the cable to the solenoid. If the break is there, then repair or replace the cable with a new one. See pages 5-027 and 5-028, also 5-031 thru 5-034, and 5-037 thru 5-046.

Valve Bank Wiring - In order to check the wiring of the valve bank harness it is necessary to unplug the 24 pin connector at the valve bank and check for continuity between pins 23/24 and the

correct bit, with the corresponding pin number that activates that bit. If you need to repair the connector, take the hood off and examine the wires as they are crimped into the slots. If you suspect that one of them is bad, take a small flat headed screw driver and gently push the wire back into the slot of the connector. Then try and test it again for continuity. See pages 5-037 thru 5-046, also 5-056 and 5-073.

D. Lighting Problems

Organ and Sign problems

General Information

In dealing with one of the most obvious problems such as all lights out, be sure that you have no other problems like characters not moving, or other movements missing. In other words, be sure that it is strictly an Organ or Sign problem before proceeding. Extreme caution must be exercised when working near live A C. wiring.

Note: If you suspect that you have an A.C. problem, you may want to locate the Organ and Sign electrical hook-up and breaker. The Organ and Sign are plugged into the convenience receptacle on the back wall of the platform. The breaker for this circuit may, or may not be located in panel L3, so a search for the breaker that controls the convenience outlet in the theater may be necessary.

Testing Organ or Sign Driver Boards - Go to the voltage regulator on the board and see if it has a power output. Be careful - live A.C. Voltage. Read the voltage on the voltage regulator legs; the center one is common and the outer one to the right is positive, see pages 5-059 thru 5-061. If there is voltage on the regulator, then check the A.C. input on the 3 pin terminal, pins #1 & #3. See charts for Organ cables and pin outs on pages 5-054 and 5-059, also 5-060 and 5-062. If you have an A.C. 110 volt input and no voltage on the regulator then replace the Organ Driver Board.

If there is no A.C. coming in, then check the breaker and reset it if necessary.

If you have A. C. input and an output on the power supply from the board, find the opto-isolator that controls the particular set of lights you have in question, see pages 5-060 and 5-063. Take a small screw driver and bridge between pins 4 and 5 of the 'opto' or MT1 to the gate of the transistor or triac. Also check the collector leg of the transistor and see if the 25 volts is reaching the board. If it works when you bridge the 'opto' and you have 25 volts present, then repair or replace the transistor, or the board.

Strobe light trouble-shooting - In the case of the strobe light, you can test it independent of the driver board by bridging the red or yellow wire to the black wire, located in the first position of the terminal strip at the lower left, page 5-062. (Caution again must be advised in the case of hot A.C. wiring.) Replace it if it does not work.

Don't forget, it may be just the bulb that is burned out so try replacing the bulb or exchanging it before you replace the whole assembly of the strobe.

RAF 100 Light Control Box

Pin up the bit and check for voltage on the transistor as you would for any other bit or movement. Watch for the light,and exchange the Long Driver Board -- repair or replace if necessary.

Once you have established that the Long Driver Board is good then move on to the light box, see chart - pages 5-067 and 5-081, also 5-074. Determine exactly which bit is the one to control the light and find the corresponding number in the light box and the Light Module board that controls it. (Be careful not to touch or brush up against the A. C. voltage). Jumper the red terminal #3 to a good ground to be located on the chassis or box. You should read 25 volts on that test point. If you do not have that voltage on the CEI 1 Board, then the cable is possibly bad, exchange it for another cable. If that is the problem then repair or replace it.

On the inside left hand side of the light box, find the correct terminal in the white set of terminals and jumper this terminal with the matching one in the yellow set of terminals. (Be extremely careful -- Be sure the jumper is insulated . DO NOT TOUCH the exposed lead, bare wire or terminal. This is live A. C. 110 volts!) If that turns the light on, then replace the CEI 1 board and triac with one of the spare ones at the bottom right hand corner of the box. Be sure you shut off the whole box before you replace the Module.

CC Panel (8 Triac or 20 Triac Boxes)

Take a reading on the 110 volt A.C. line to see if you have the power to the box. You can read the voltage with a probe at the negative lead at the 1000 mfd. cap. on the power supply. The positive side can be read from the black wire of the A.C. input. Caution, live 110 volts in the Triac box. See the circuit layout drawing for 8 or 20 Triac Driver boxes of detailed information, see pages 5-065 and 5-071.

Houselight Problems

Check the override switch and see if it has been switched to override by mistake. If so, return it to the correct position. Verify the background music mute by hitting a manual stop and then play again and see it the background music turns off and on correctly. If the background music mutes, but the lights do not dim, then replace Q3. If the background music doesn't mute then replace the Show Control Board.

A.C. Monitor - Check the A. C. Monitor output on pin #5. You should read 12.5v. A. C. at 120hz. with a positive going pulse waveform, see pages 5-063 and 5-064, also 5-068 and 5-076. If you do not have this, then trace the A. C. signal back through the Dual P. C. Mount, cable and Tunnel, and out the rear of the cabinet. Unplug the molex cable from the J13 Interface at the rear of the cabinet, (red and white wire), and check for A. C. voltage, on the cable. Next, unplug the same cable at the A. C. monitor box and check the output of the monitor, see schematics and drawings on pages 5-063 and 5-064, also 5-068 and 5-076.

Houselight Dimmer Board - If the Houselights are in the dim position try to adjust the 'Pots' on the board see schematic, page 5-063 and 5-064. Set VR2 counter-clockwise all the way and VR3. counter-clockwise all the way. Set VR1 to minimum light level

allowable for dim position. If no change takes place, send for a new Houselight Dimmer Board.

Warning - remove the Show Control Board before jumping the pin to ground on the Houselight Dimmer Board, or you may destroy the Show Control Board.

E. Drapery Problems

Symptoms such as curtains not opening or closing, can both be considered in the same procedure. Simply isolate the problem by the location, whether SR - CS - or SL and begin your trouble-shooting steps from the identification.

First, manually override the control with the push buttons on the stage, and see if that works. If it does, then you have already determined that the Drapery Motor Controls are good. Locate the proper terminals (marked X) in the RAF 100 Box , and check the voltage for 110 A.C. Be careful - live voltage !

Check the Motor in the circuit as well as the relays and the limit switches because either of these may cause the Drapery Motor not to operate, see pages 5-077 thru 5-079.

Limit Switches

The Limit Switches are mechanical devices which will allow you to control the number of revolutions a motor will travel. When either of the contacts are closed the motor will work. If both contacts are open, it will not work. The Limit Switches are adjusted by use of the small knob on the side of the switch housing. It is very important that when the motor is in operation this knob be in the center or neutral groove. Limit switch adjustment is as follows:

1. Loosen the set screws on the master carrier.
2. Turn the adjustment screw until both contacts are open (Instructions are on the knob).
3. Find the point at which one of the contacts closes (It doesn't matter which one).
4. Close the selected contact 2 1/2 revolutions (3 revolutions for center stage). The motor is now roughly adjusted.
5. Remember to place the adjustment knob back into neutral.
6. Loosen the set screws in the top of the master carrier (mules), so that the cable may pass freely through the mule.
7. Test the adjustments cautiously with one hand on the stop button.
8. Fine tune the adjustments by marking the cable with tape or a marking pen, and use this to insure that the cable travels the proper distance.
9. Once satisfied that the motors are properly adjusted, re-tighten the set screws on the master carrier. Make sure the master carriers are in the correct position.

Note: The Limit Switch may be removed from the motor in the following manner: Disconnect power. Remove flex attached to the Limit Switch. Remove the chain drive. Unfasten three bolts, which attaches Limit Switch to the Motor housing. Limit Switch repair should not be attempted.

Proceed with caution - 110 volt A.C. trouble-shooting. If there is no A. C. then power down the circuit and trace it back by continuity checking, through the circuit. Check the disconnect, overload protector, timer relay switch and stop push button. Repair or replace any components if necessary. Check the timer relay to be sure it is set at a two second delay.

Go to the RAF 100 Box and take a reading on the red terminal #3 and ground as you would for a light problem, you should have 25 volts D. C. see page 5-009. Caution again must be noted as you work inside the box. If you do not have that reading in voltage, then check the cable leading from the Controller to the RAF 100 Box. Repair or replace it if necessary. If you have the 25 volts, then jumper (being careful and using an insulated jumper wire), the (black) #1 terminal to the chassis, (Caution A. C. Voltage); that controls the Drapery on the Light Module Board, and see if that activates it. If this works then replace the Light Module Board and Triac. Shut off the power then turn it back on again after you have finished.

F. Miscellaneous Problems

Background Music will not Mute - relay in the DBX Box may be bad, repair or replace it. It may just be the diode across pins 7 and 8 on the relay, so check that first before replacing the relay, see pages 5-019 thru 5-025.

If it does not switch then verify that the cable is good by checking the voltage across the pins. If the cable is good, replace the Q1 Transistor on the Houselight Dimmer Board. If that still doesn't work, then replace the Houselight Dimmer Board.

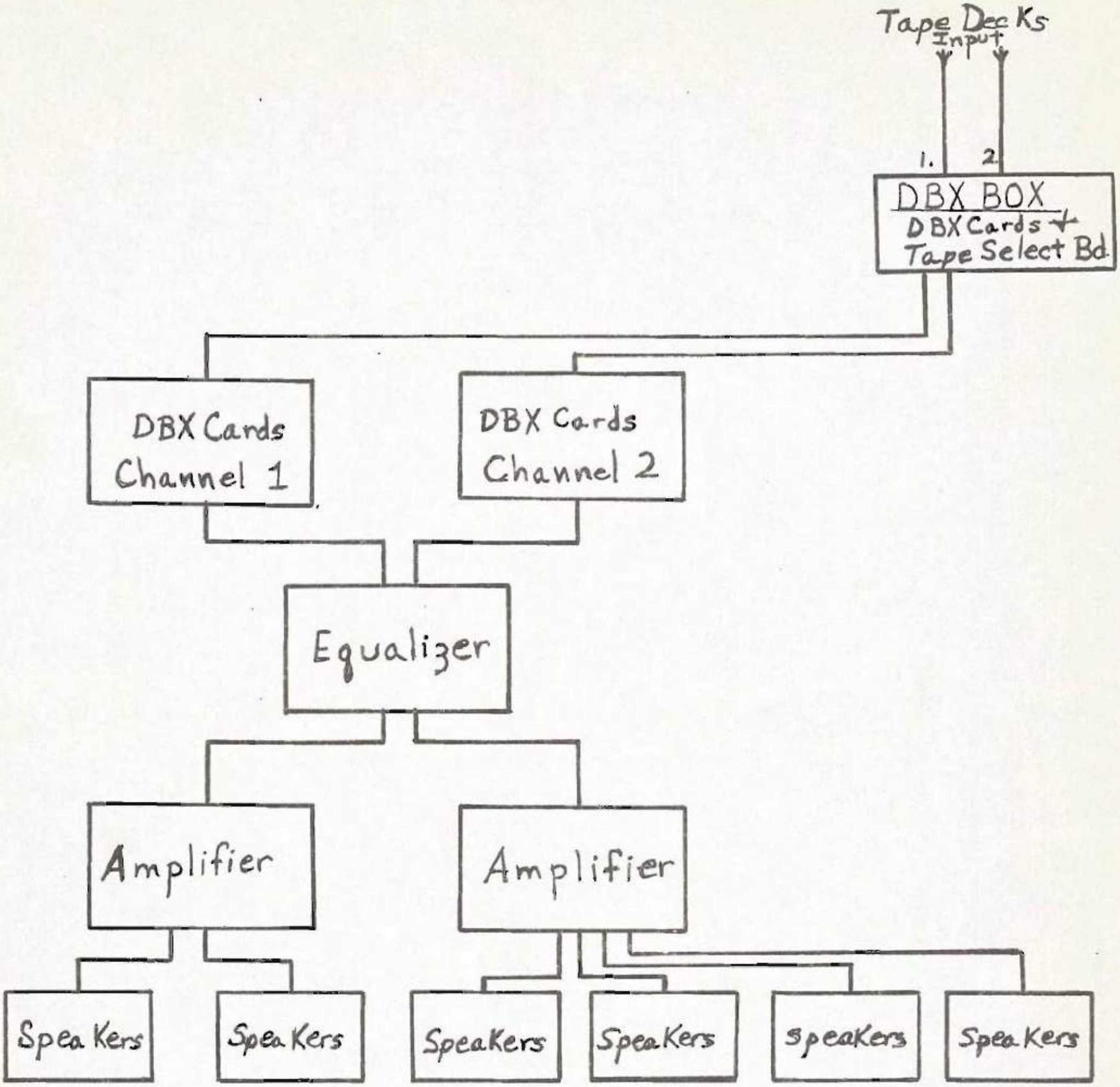
Dual Pressure Manifold does not operate - If the Dual Pressure Manifold does not operate, be sure it is not in the mechanical end first. Manually activate the Dual Pressure with the manual override switch located on the manifold, see the Mechanical guide, Part 3 pages 3-004.

Pin up either bit 40 in the top drawer or bit 60 in the bottom drawer, (both bits must be operable in order for it to function), as you would for any other movement, see bit chart for the procedure pages 5-037 thru 5-046. If that works then repair or replace the Long Driver Board.

If you have pinned up the bit and it doesn't work then take a reading on the output of the gray wire jumpering the top and bottom drawers together. If there is 25v. there, then trace the cable back toward the Dual Pressure Manifold separating the cable at the connectors, checking the voltage between the pins to find if there is a break or a poorly seated connector.

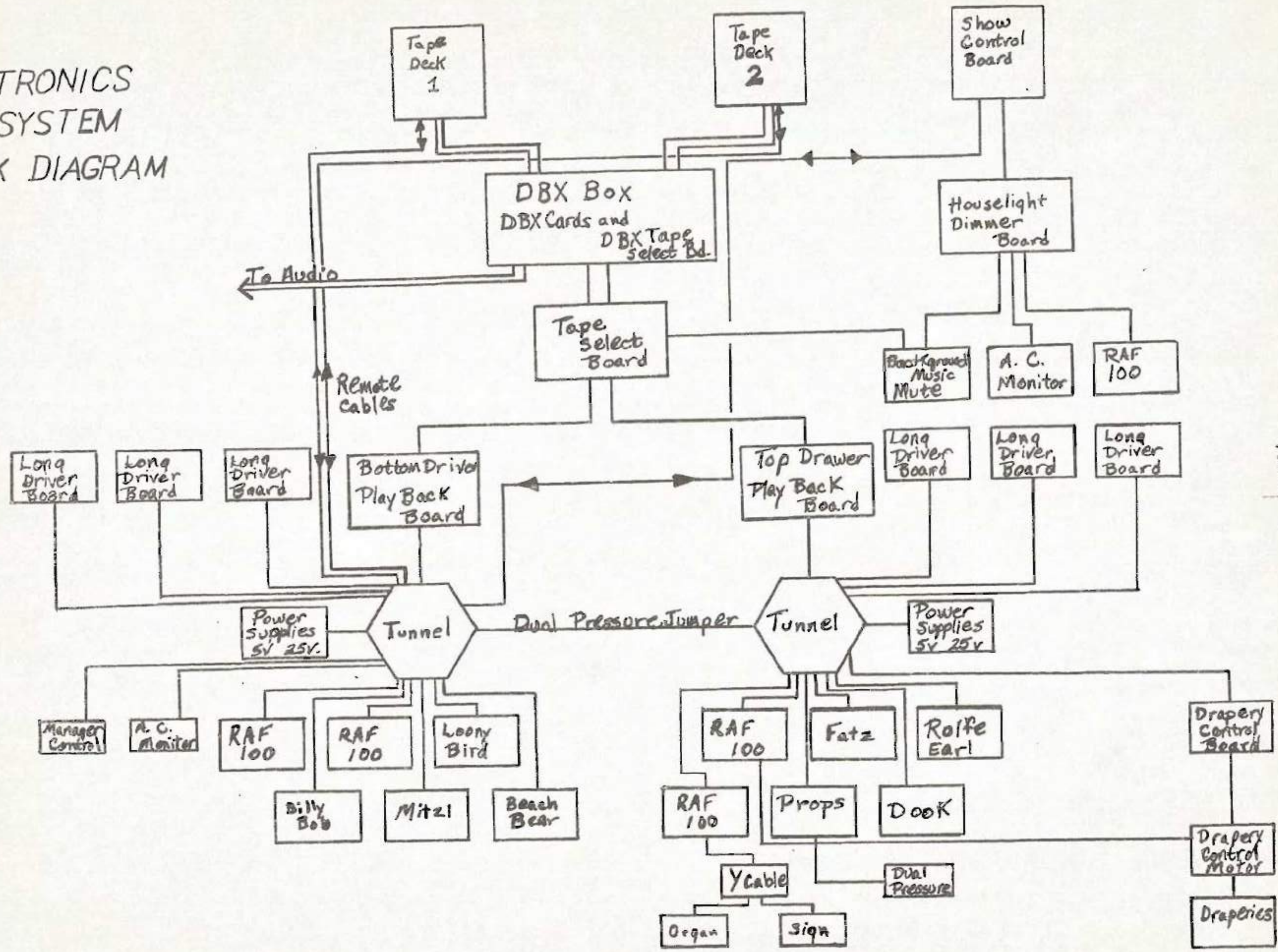
List of Drawings

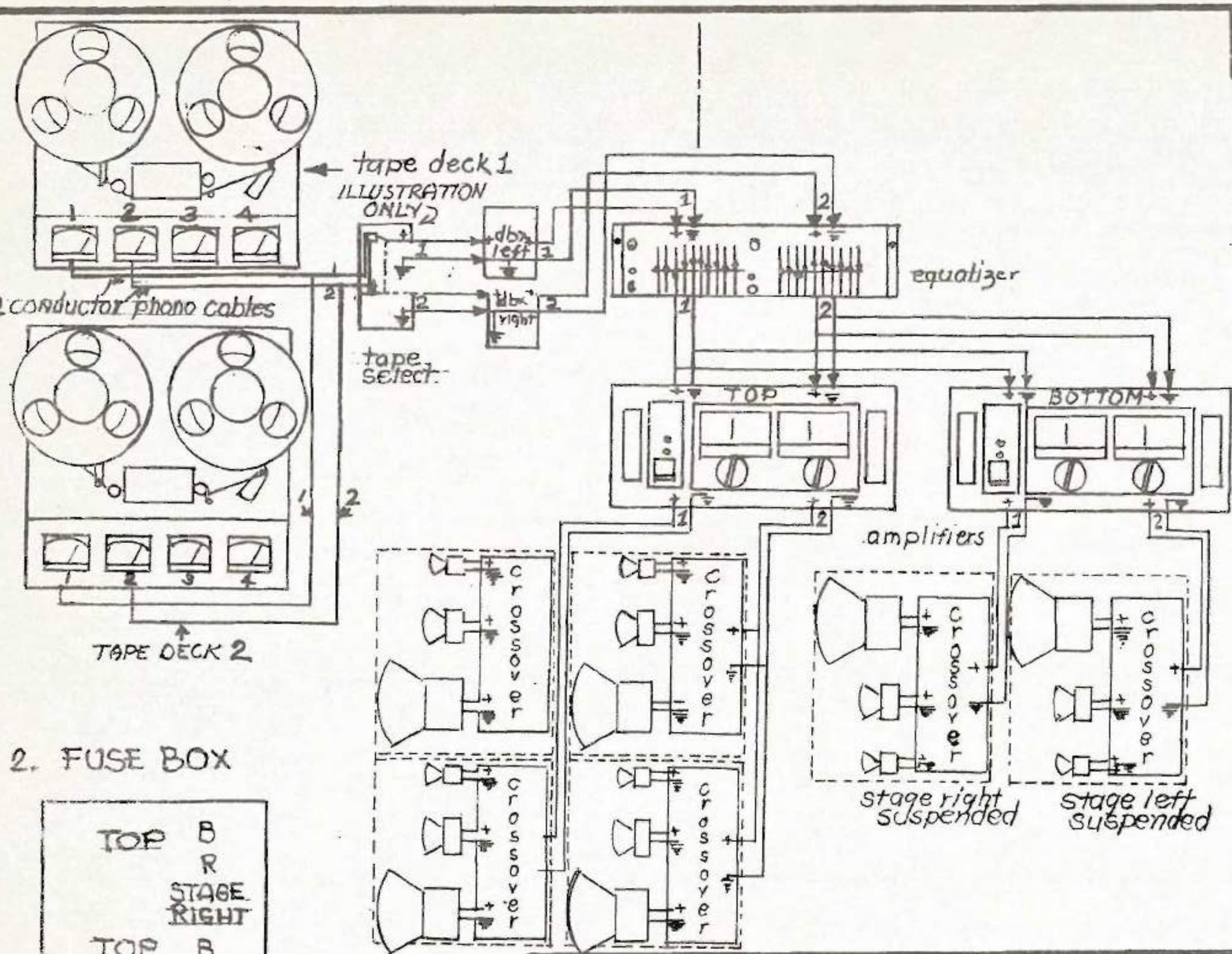
List of Drawings cont.



ELECTRONICS AUDIO SYSTEM BLOCK DIAGRAM

ELECTRONICS DATA SYSTEM BLOCK DIAGRAM





WIRING

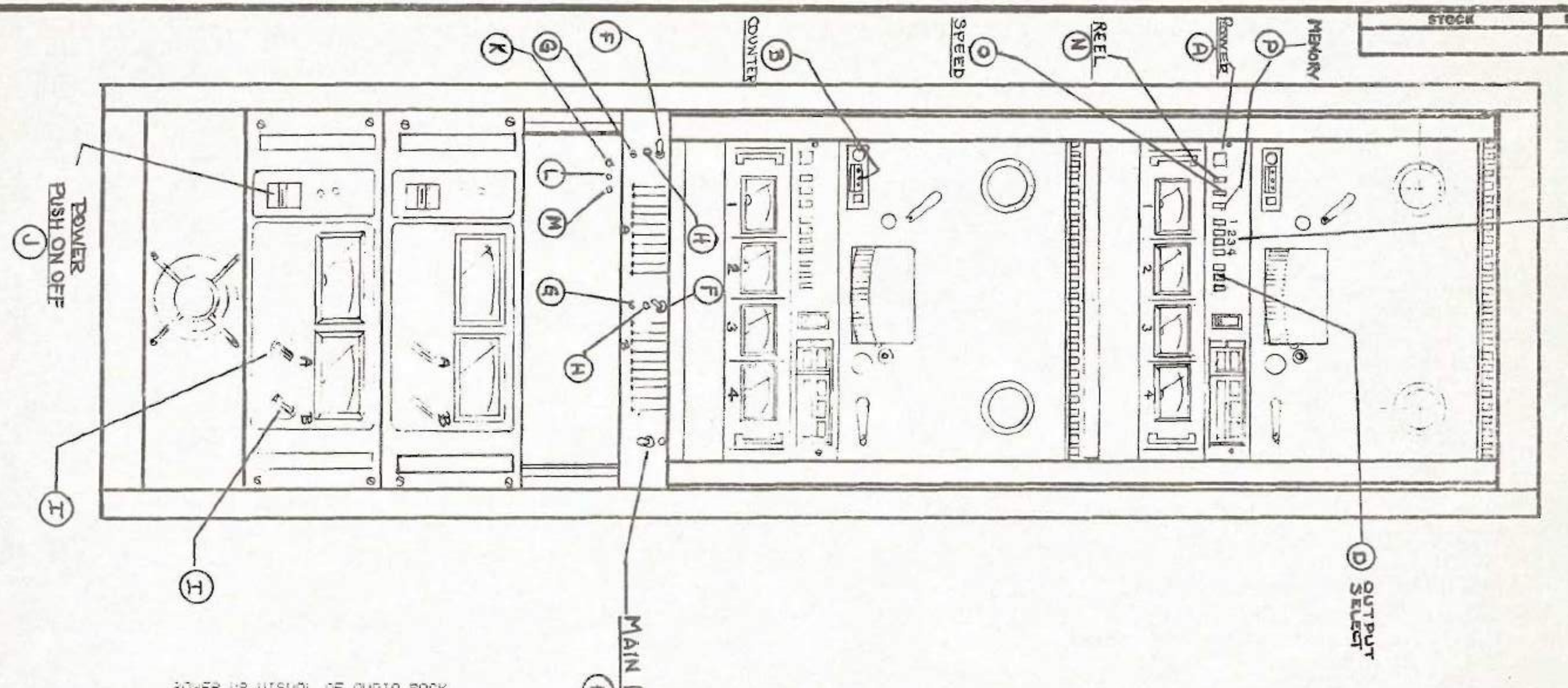
COPPER - RED
SILVER - BLACK
FUSE TO RED AND COPPER
RED TO SIDE
COPPER TO CENTER

2. FUSE BOX

TOP B R STAGE RIGHT
TOP B R STAGE LEFT
BOTTOM B R STAGE RIGHT
BOTTOM B R STAGE LEFT

STOCK	MAT'L.

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REVISIONS (REV. / DATE / BY)	PRODUCTION APP. DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 — SCALE: — DRAWN BY TR - CR.
	Q. C. APPROVAL DATE	DATE: 8 - 22 - 83 — CHK'D. BY A.L.B.
	ITEM: AUDIO SYSTEM	UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:	DRAWING NUMBER



POWER UP VISUAL OF AUDIO RACK

A. Teac power switch should be on and meters lit
B. Counter - set to 0
C. Functions Select buttons - all out
D. Output Select - the Sync/Normal button should be depressed
E. Equalizer main power on - LED indicates power on
F. Equalizer channel switches - both on 'in' position
G. Equalizer gain should be app. 11 O'Clock
H. Equalizer LED channel indicators should not be lit
I. Amp dials should be turned down before power up-- and then reset after power up.
J. Amps power button, in down position 'on', up position - off
K. LED indicator for DBX Box should only be lit for Special Deck
L. DBX left phono jack (vacant) for VCR input - Top Drawer
M. DBX right phono jack (vacant) for VCR input - Bottom Drawer
N. Reel - Large - button out
O. Speed - Low - button in
P. Memory - On - button in

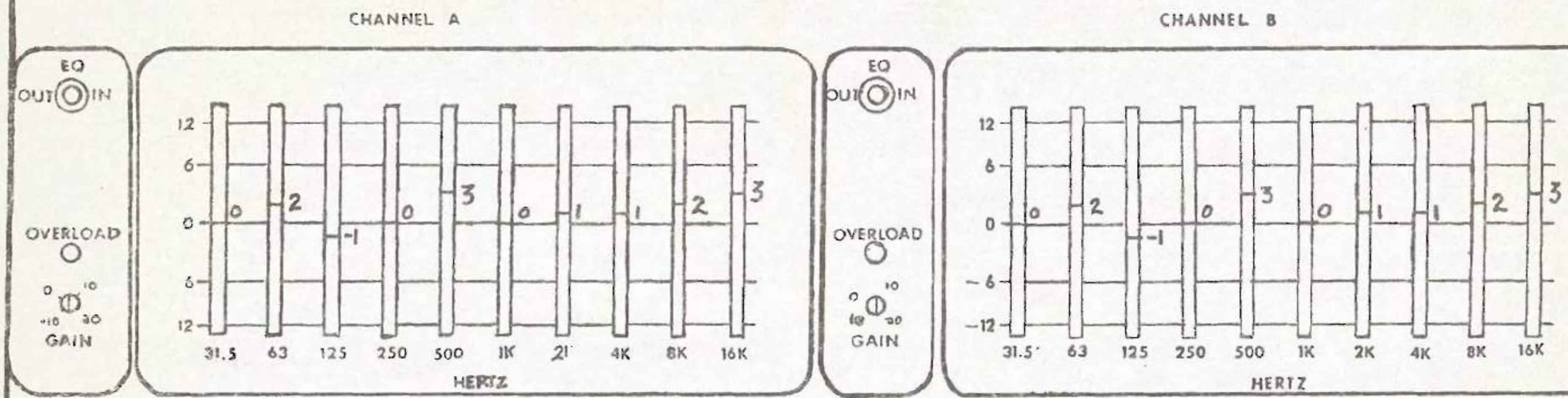
STOCK | MAT'L

All tol. are Nonaccumulative
REVISIONS — REV. | DATE | BY
R.+D. APPROVAL — DATE
PRODUCTION APP. — DATE
Q. C. APPROVAL — DATE

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DEBURR AND BREAK ALL SHARP CORNERS ± .010
SCALE: 3/16" = 1
DATE: 9-23-83
DRAWN BY C. RITTER
CHK'D. BY [signature]
UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .XX ± .010 .XXX ± .005
ITEM: AUDIO RACK ASSEMBLY-
MAT'L:
DRAWING NUMBER

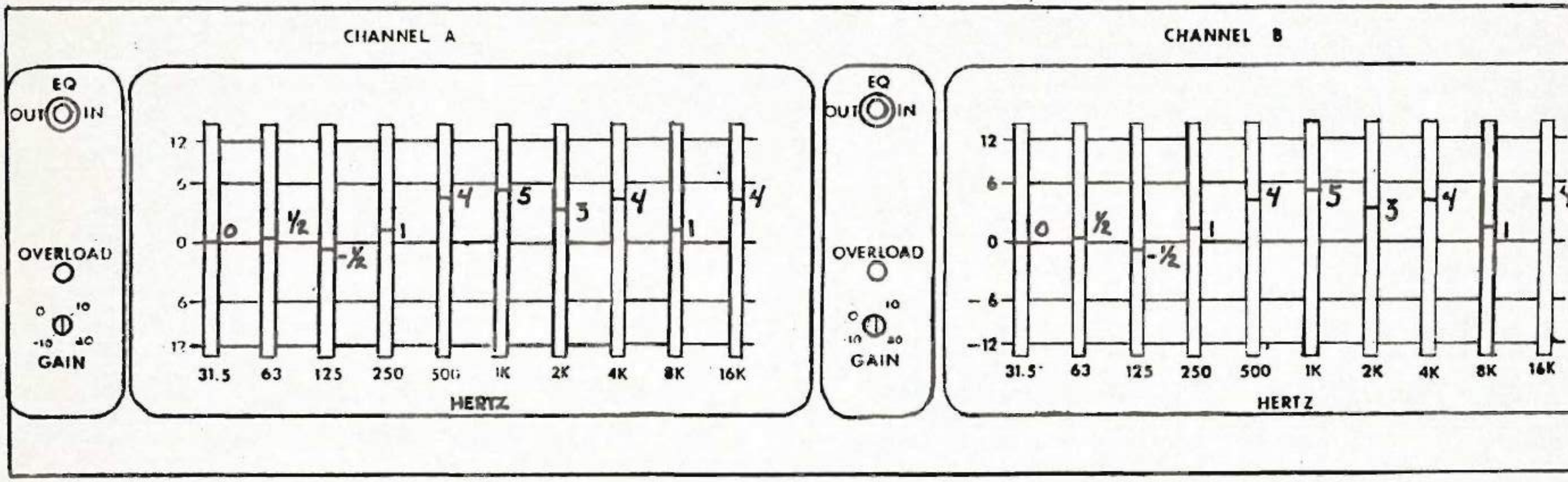
STOCK	MAT'L.



5-017

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	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY
REV. / DATE / BY			DATE:	CHK'D. BY
	ITEM: Settings Equalizer - 2000 Sq Ft.			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L: or less - Room Size			DRAWING NUMBER

STOCK	MAT'L.



5-018

All tol. are Non-accumulative

R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL DATE

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REVISIONS

REV.	DATE	BY

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE:

DRAWN BY

CHK'D. BY

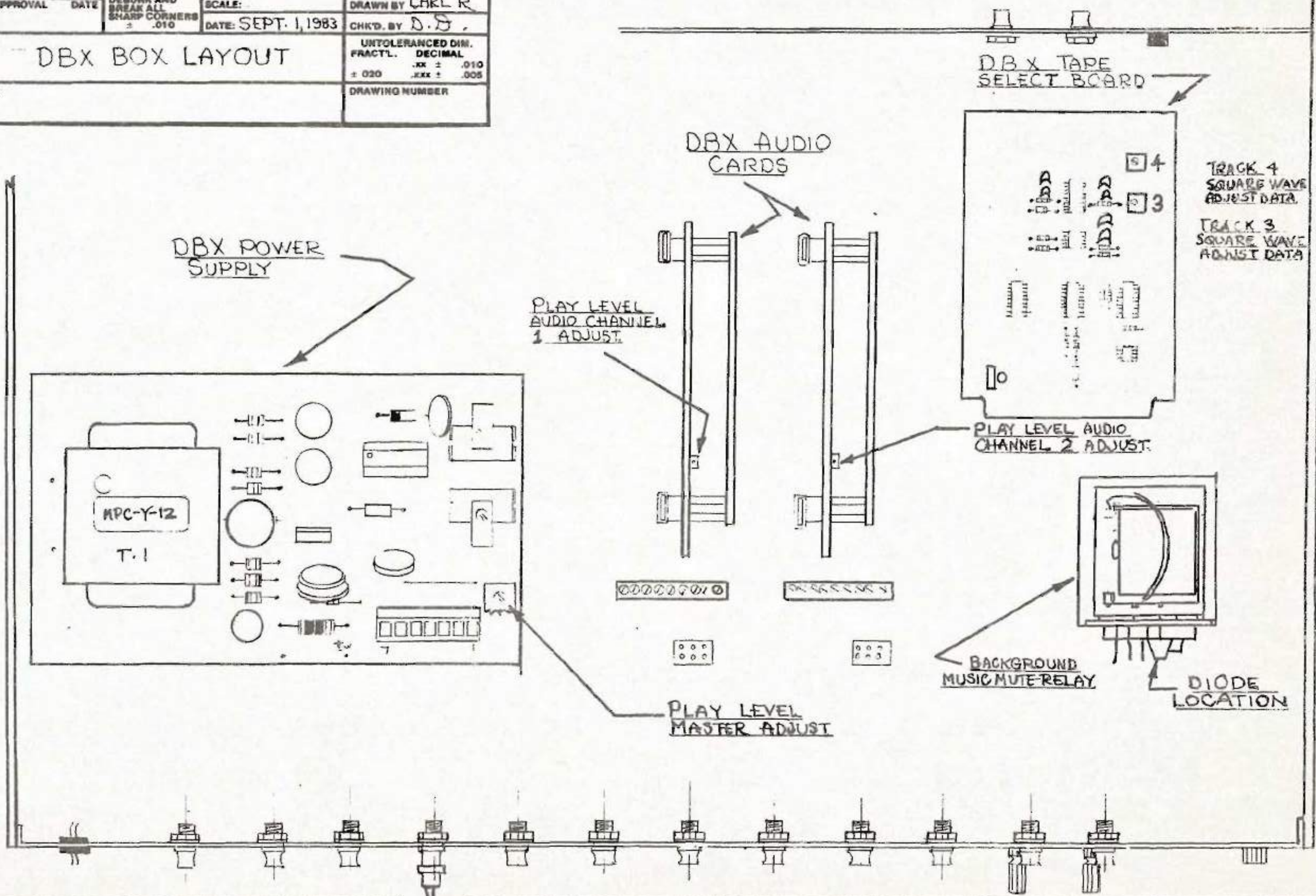
UNTOLERANCED DIM.
FRACT'L. ± .020
DECIMAL .XX ± .010 .XXX ± .005

ITEM: Equalizer Setting

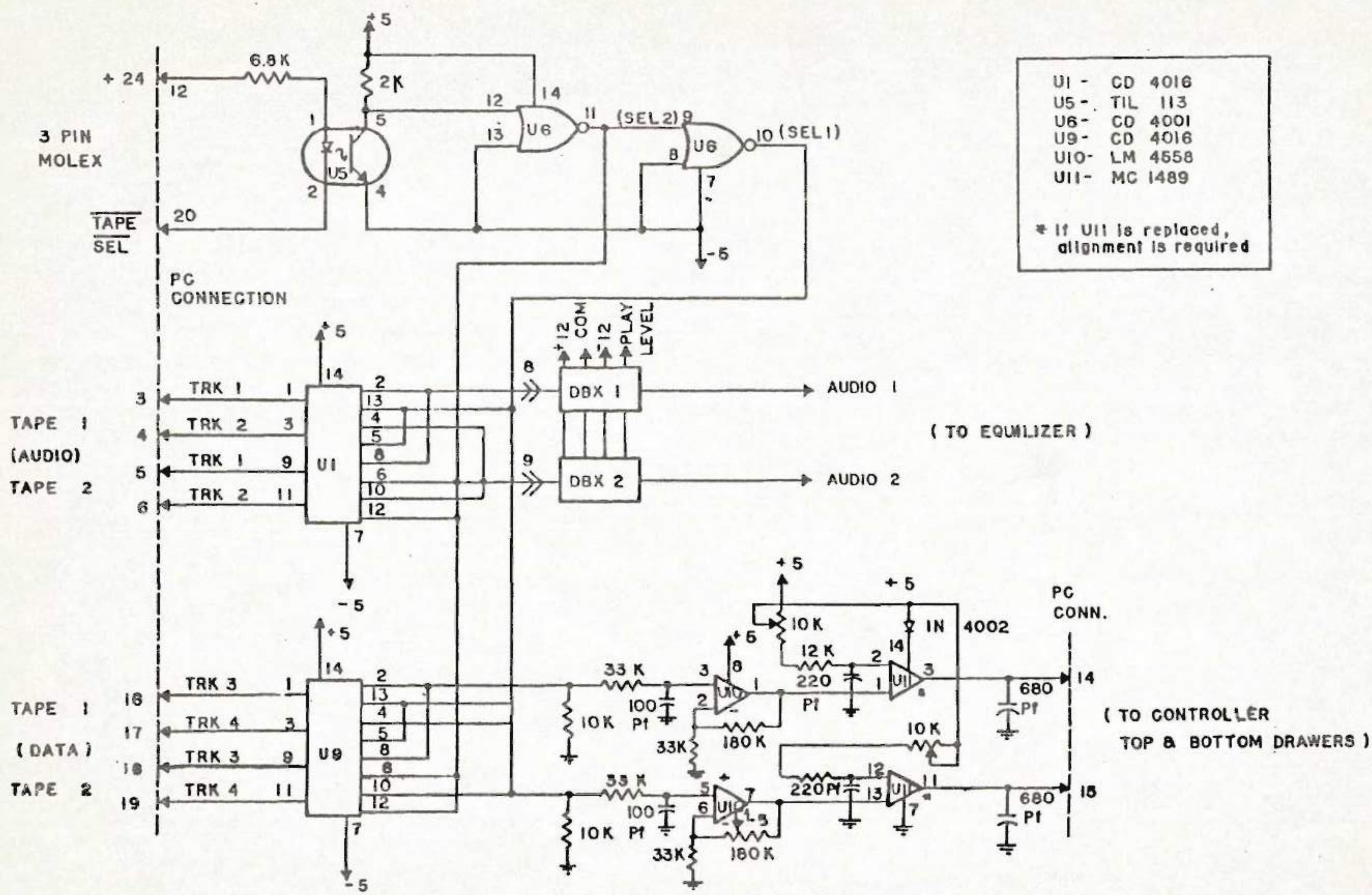
MAT'L: Room Size 2000 sq. ft or more

DRAWING NUMBER

All tol. are Non-accumulative	R.+D. APPROVAL DATE	CREATIVE ENGINEERING INC	Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited.
REVISIONS	PRODUCTION APP. DATE		
REV. / DATE / BY	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:
		DATE: SEPT. 1, 1983	DRAWN BY CARL R
			CHK'D. BY D.S.
	ITEM: DBX BOX LAYOUT		UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .XX ± .010 .XXX ± .005
	MAT'L:		DRAWING NUMBER



DBX / TAPE SELECT BOARD

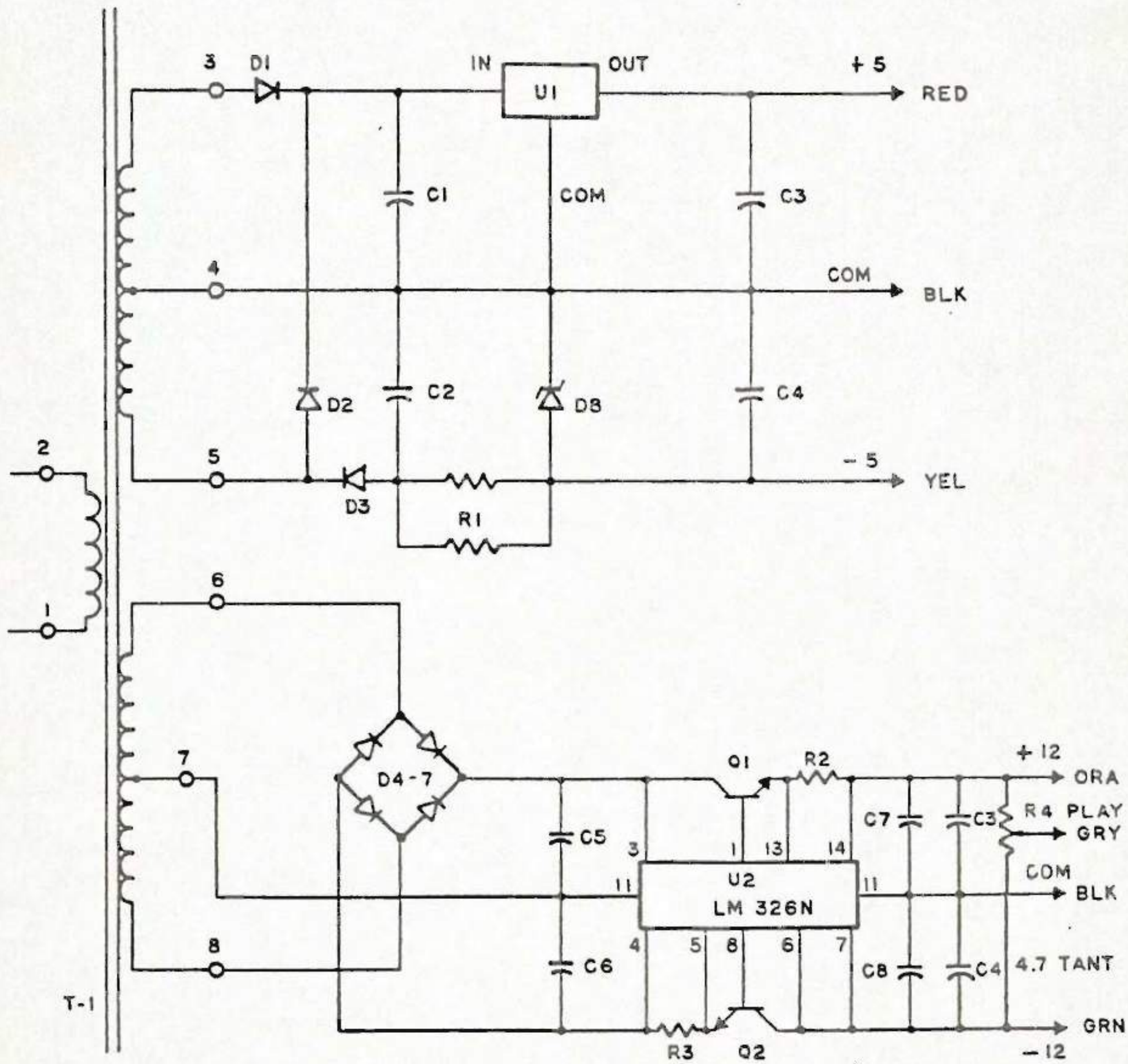


CREATIVE ENGINEERING INC

DRAWING NUMBER

DBX / TAPE SELECT BOX

POWER SUPPLY



T-1	SIGNAL MPC-Y-12
D1-7	IN 4002
D8	IN 5231 B
U1	LM 341 T-5
U2	LM 326 N
C1	1000 uf/16 v
C2	100 uf/16 v
C5, 6	100 uf/35 v

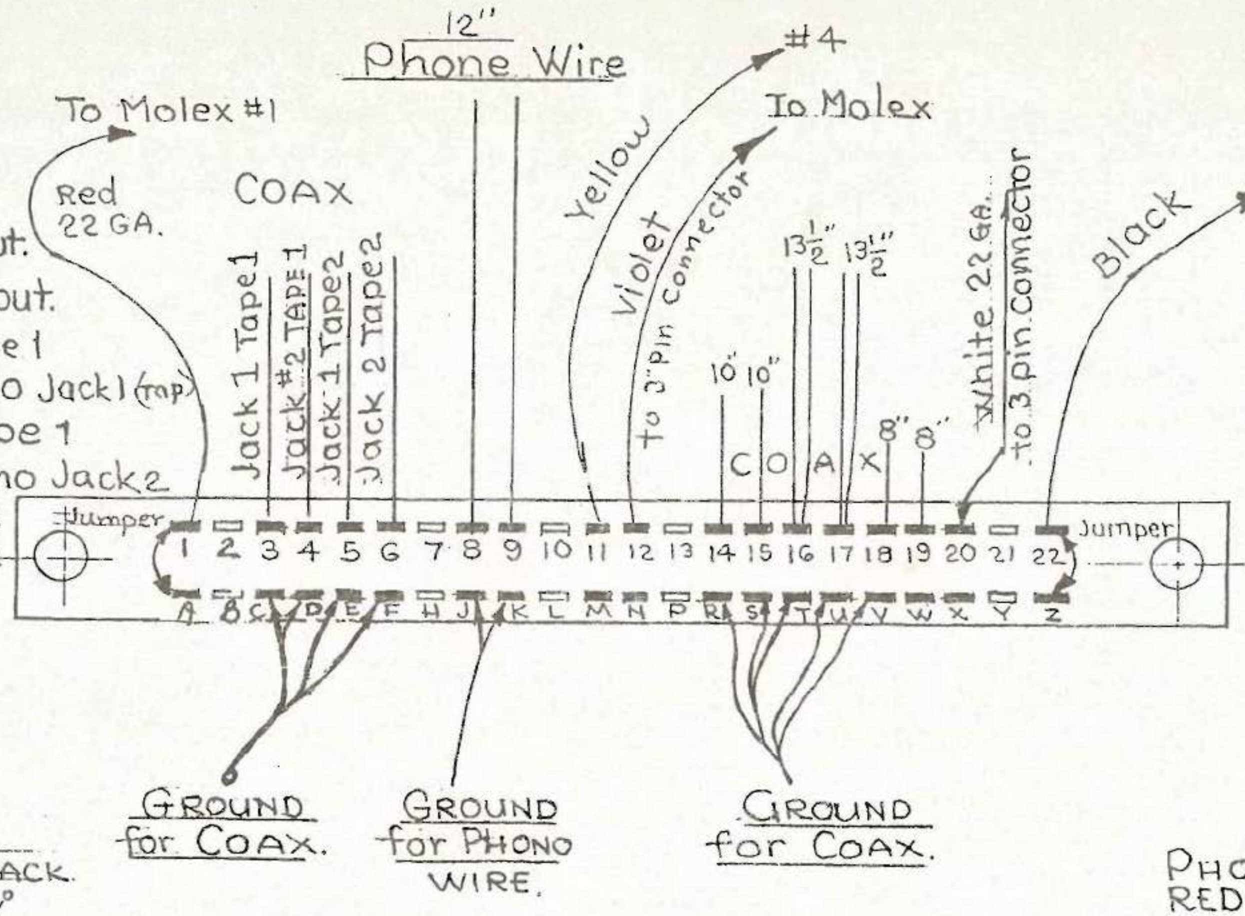
C3, 4, 7, 8	.1/25v DISK
Q1, 2	MJE 800
R1, 2	300 uf 1/2 w
R2, 3	6.2 r 1/4 w
R4	50K POT

DRAWING NUMBER

CREATIVE ENGINEERING INC

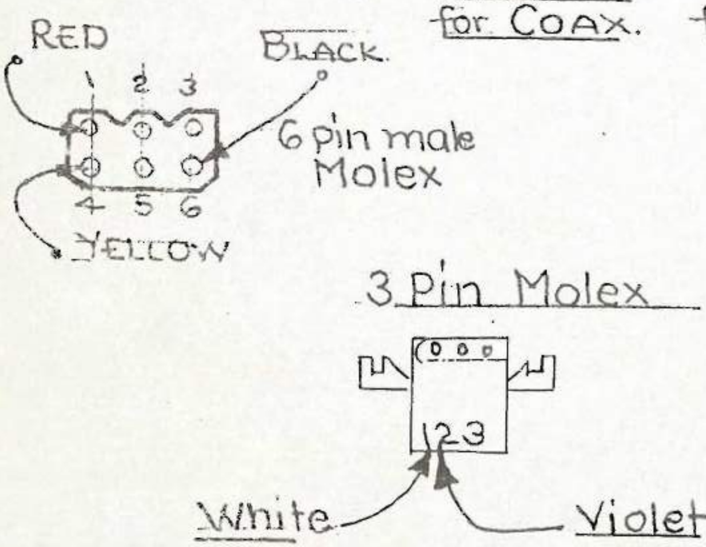
COAX LABELS

PIN	FUNCTION
14	Jack 3/output.
15	Jack 4/output.
16	Jack 3 Tape 1
2nd.	Front Phono Jack 1 (Top)
17	Jack 4 Tape 1
2nd	Front Phono Jack 2
18	Jack 3 Tape 2
19	Jack 4 Tape 2



WIRE

LENGTH	INCHES
COAX #3	16
PIN #4	15
#5 & 6	8
#14 & 15	10
#16 & 17	13½
#18 & 19	8
PHONO WIRE	12"
RED & YELLOW	8
VIOLET & WHITE	8
BLACK	10

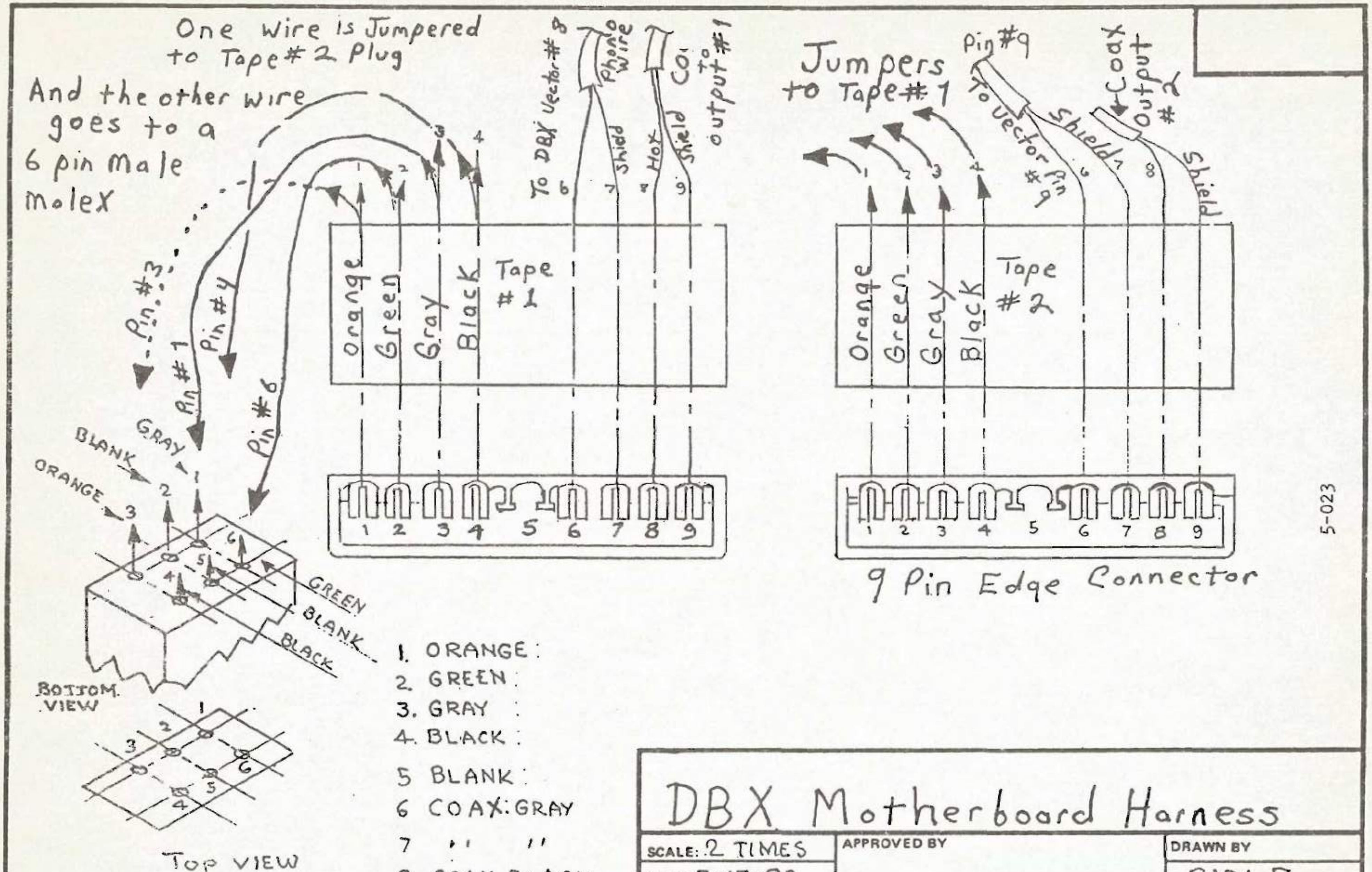


SCALE: 1½" = 1
DATE: 5-17-82
APPROVED BY
DRAWN BY Carl R.

DBX HARNESS

Ground - letter side
Separate opposite ends, strip shield.

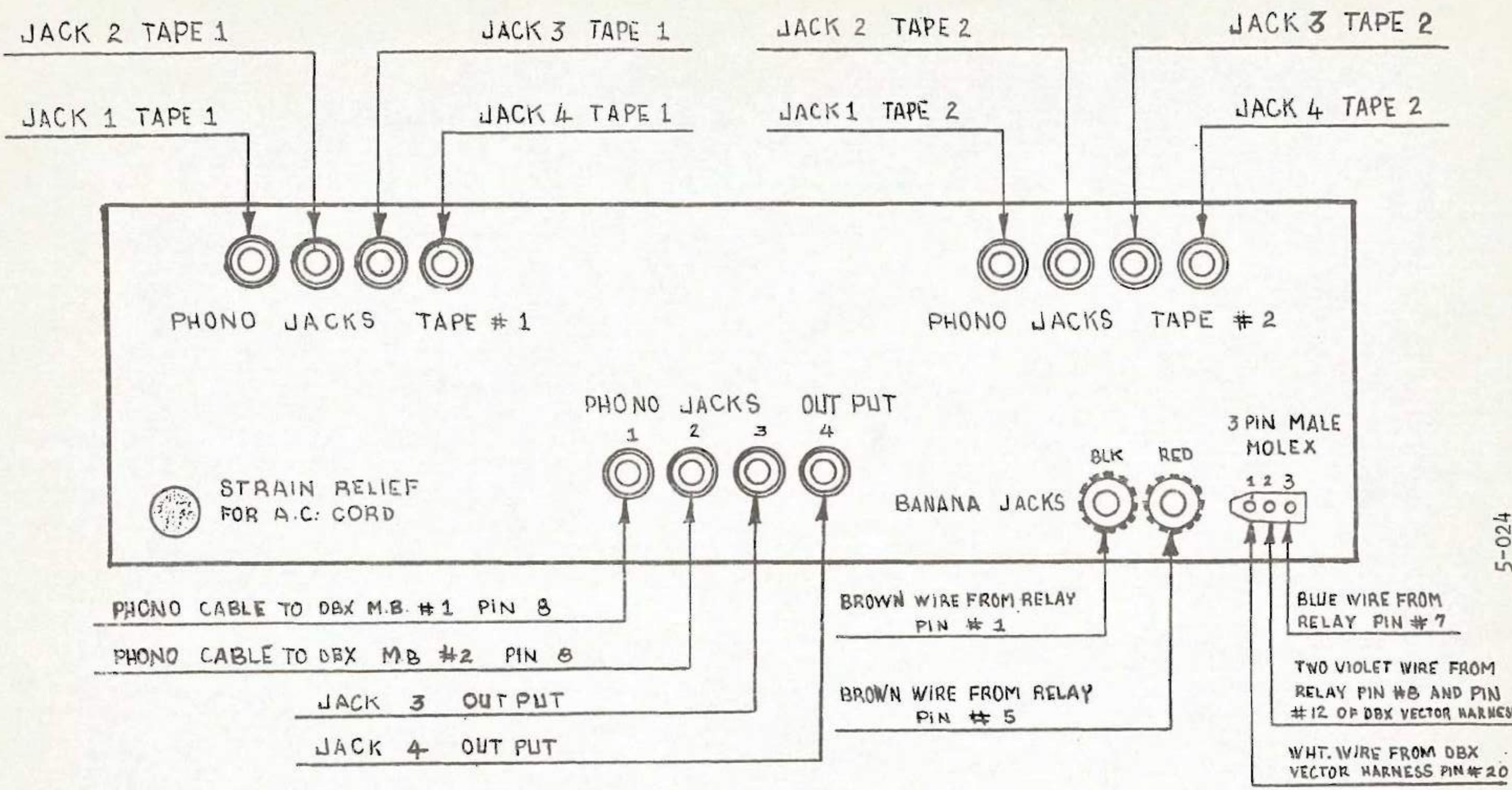
DRAWING NUMBER



1. ORANGE :
2. GREEN :
3. GRAY :
4. BLACK :
5 BLANK :
6 COAX: GRAY
7 " "
8 COAX. BLACK
9 " "

DBX Motherboard Harness

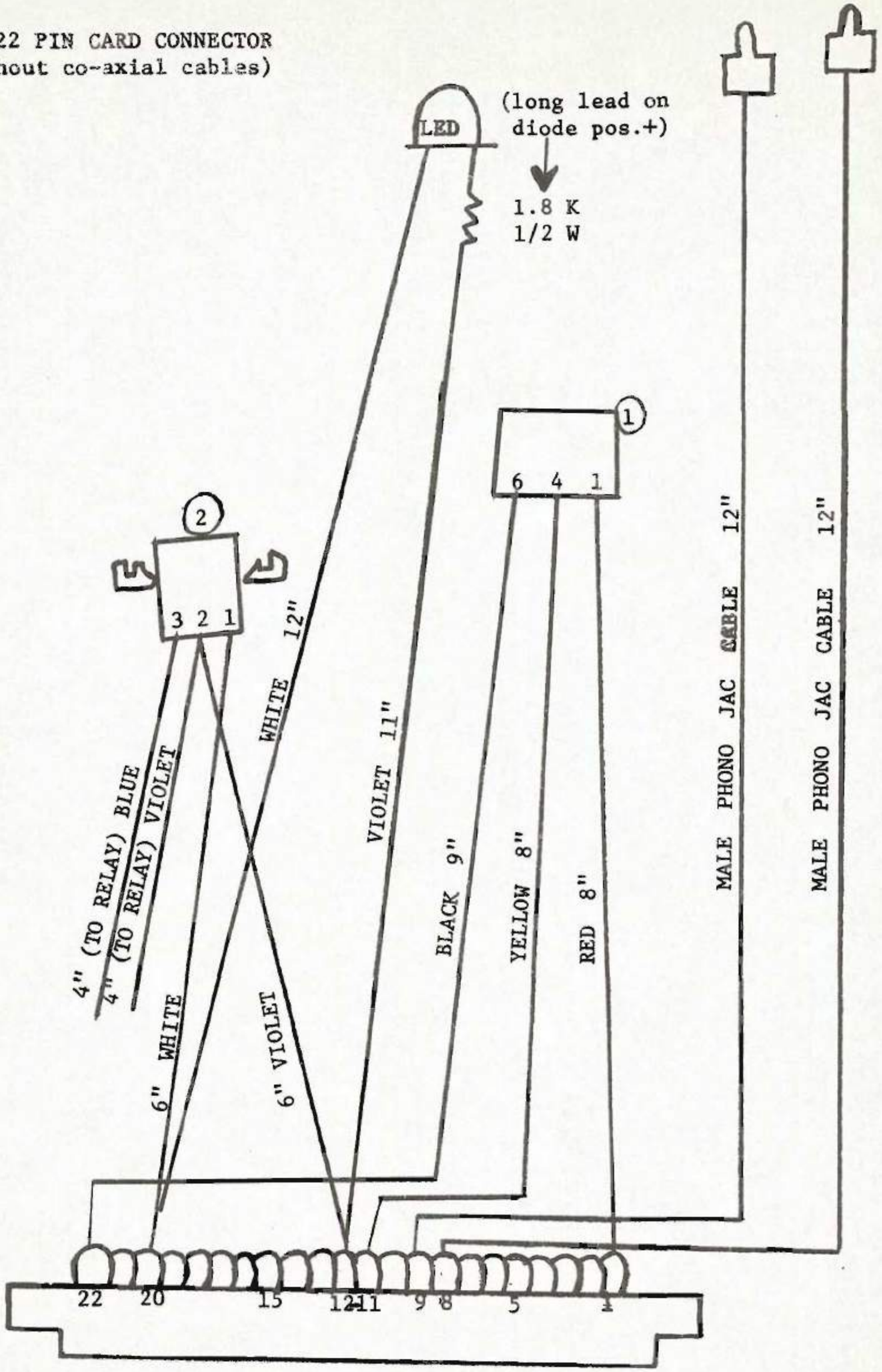
SCALE: 2 TIMES
DATE: 5-17-82
APPROVED BY
DRAWN BY CARL R...
DRAWING NUMBER



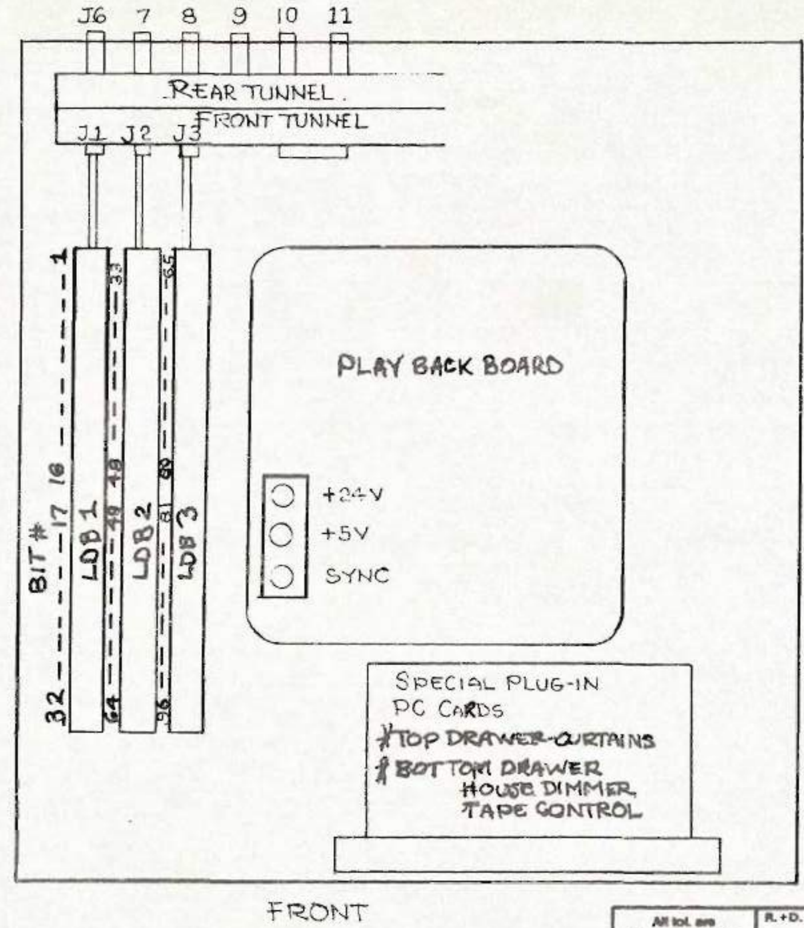
5-024

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REVISIONS	PRODUCTION APP. DATE [signature] 8-12-8[illegible]	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:
REV. / DATE / BY	Q. C. APPROVAL DATE	DATE: AUG. 11, 1983	DRAWN BY MANNY
			CHK'D. BY [initial]
	ITEM: FRONT PANEL DBX BOX WIRING		UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER

DBX 22 PIN CARD CONNECTOR
(without co-axial cables)



ALL WIRES 22 AWG
(1) 6 PIN MALE MOLEX CONNECTOR, FEMALE PINS
(2) 3 PIN MALE MOLEX CONNECTOR, FEMALE PINS



STOCK	MAT'L

All tol. are Non-accumulative

REVISIONS

REV.	DATE	BY

R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL DATE

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DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 8-23-83

DRAWN BY CARL R

CHK'D. BY D. 79.

ITEM: TOP & BOTTOM DRAWER LAYOUT

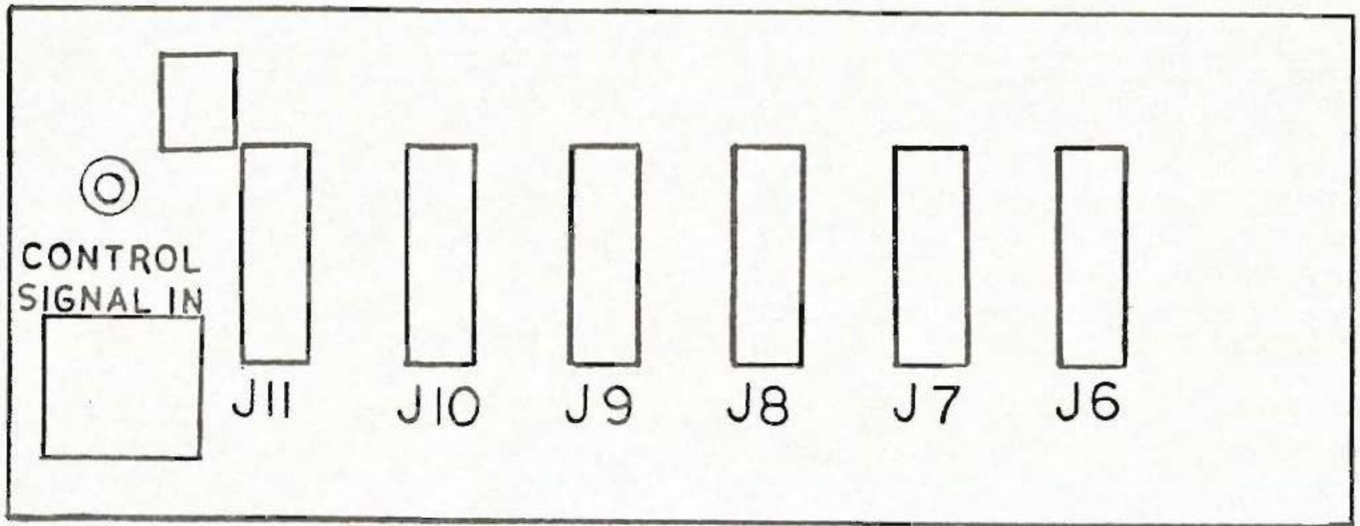
UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005

MAT'L:

DRAWING NUMBER

STOCK	MAT'L.

TOP DRAWER TUNNEL

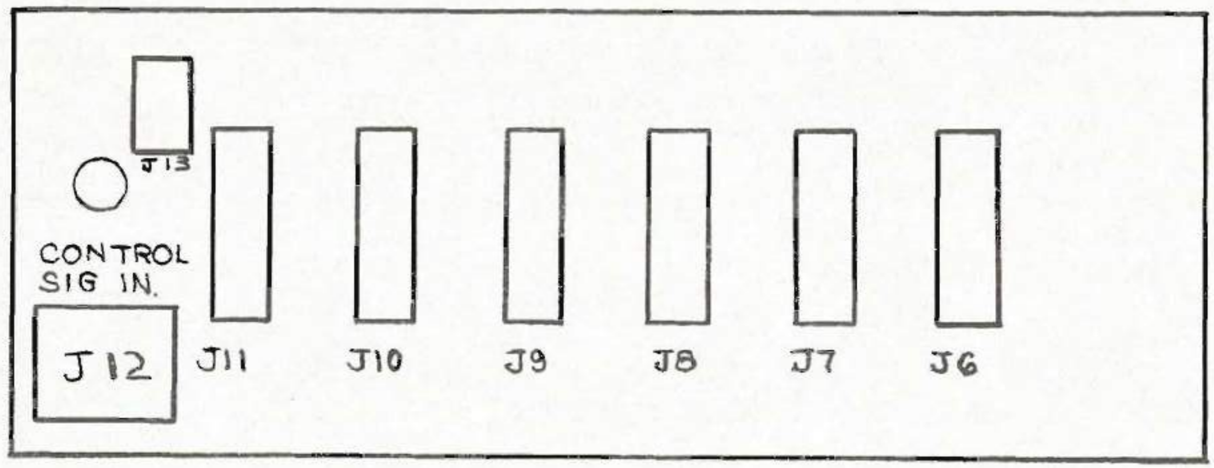


REAR OF DRAWER

5-027

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	PRODUCTION APP. DATE		
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY K.S.
REV. / DATE / BY			DATE:	CHK'D. BY DLD
	ITEM:		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER

STOCK	MAT'L.

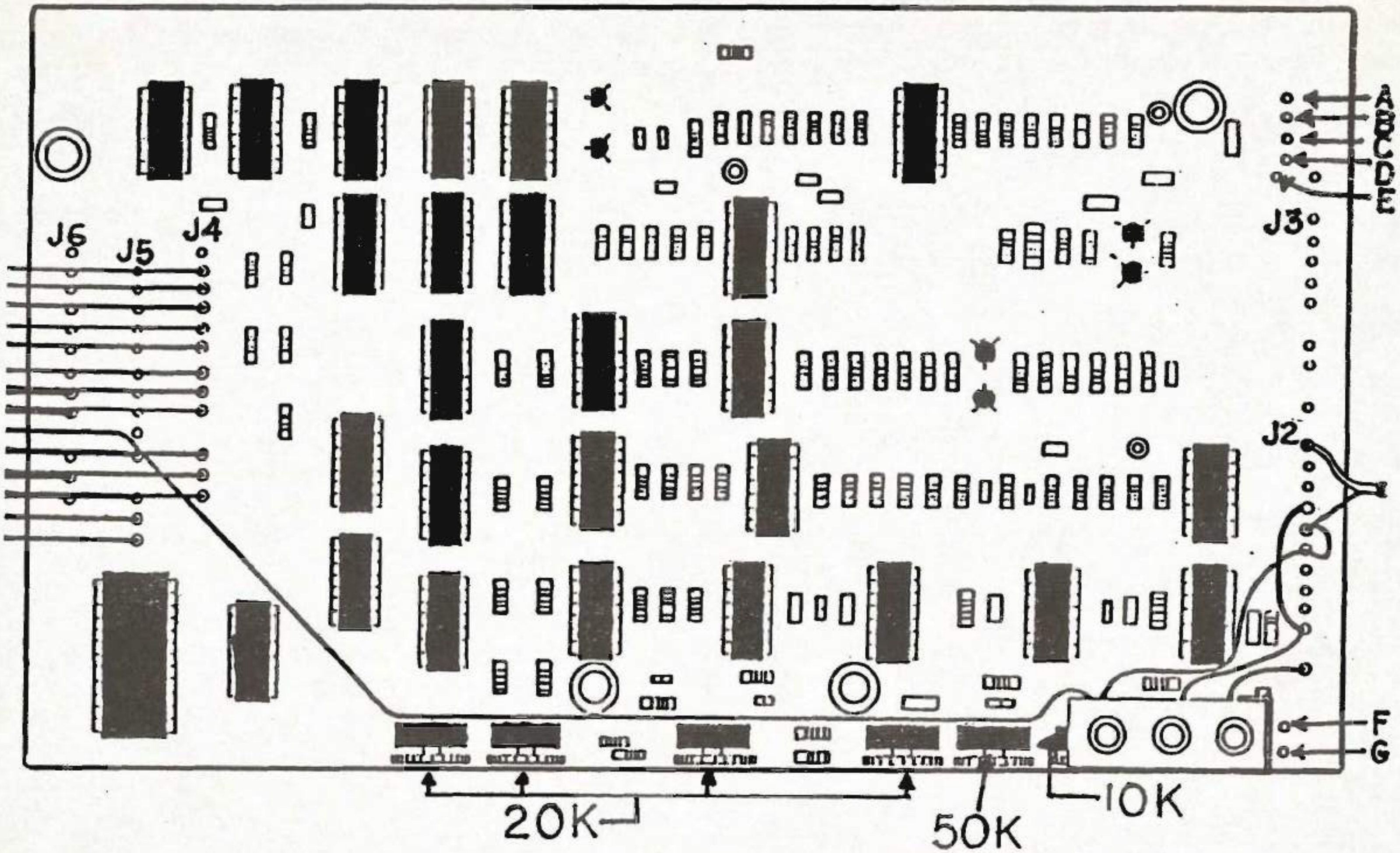


REAR OF DRAWER

5-028

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	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY TR CR
REV. / DATE / BY			DATE: 8-22-83	CHK'D. BY
	ITEM: BOTTOM DRAWER TUNNEL			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER

STOCK	MAT'L.



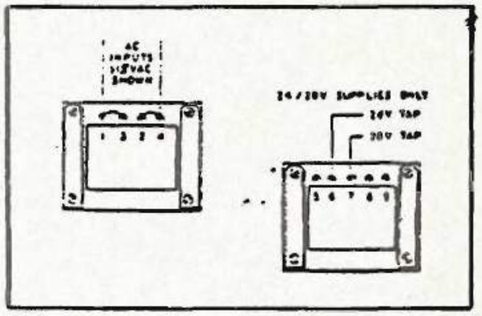
All tol. are Non-accumulative	R.+D. APPROVAL DATE	CREATIVE ENGINEERING INC		Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited
	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY
REV. / DATE / BY			DATE:	CHK'D. BY
	ITEM: PLAYBACK BOARD			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .XX ± .010 .XXX ± .005
	MAT'L:			DRAWING NUMBER

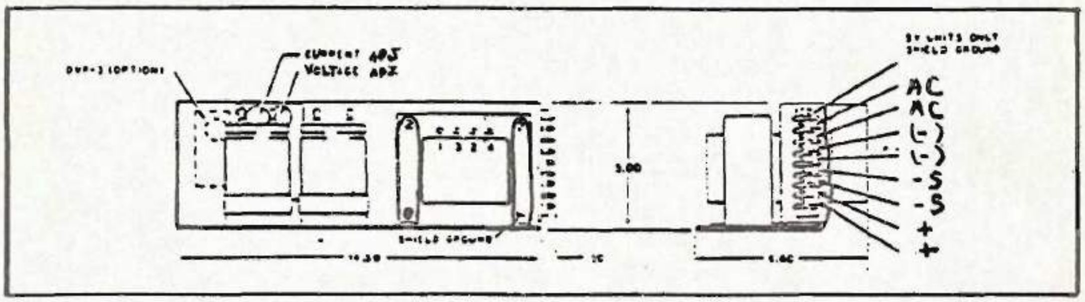
Power Supply - 25v.

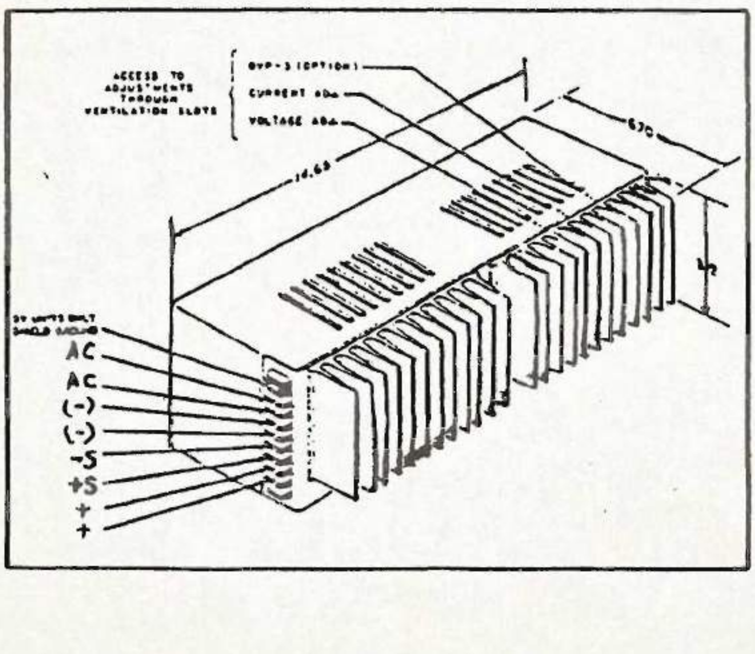
SPS / CPS 220 SERIES
SPS / CPS 320 SERIES

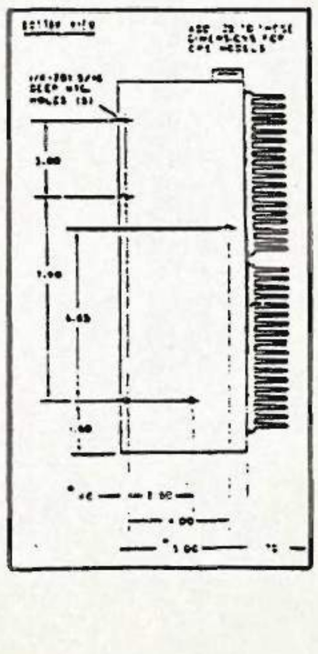
NOTES:

1. Recommended input fuse:
   SPS/CPS 220 6A
   SPS/CPS 320 7A
2. OVP-3 is compatible with 5 volt through 35V SPS/CPS 220 and 320 models. OVP-12 is for use with 5V units only.
3. Remote sense is provided on all models. Factory installed jumpers on the output terminal block are provided for the local sense mode.

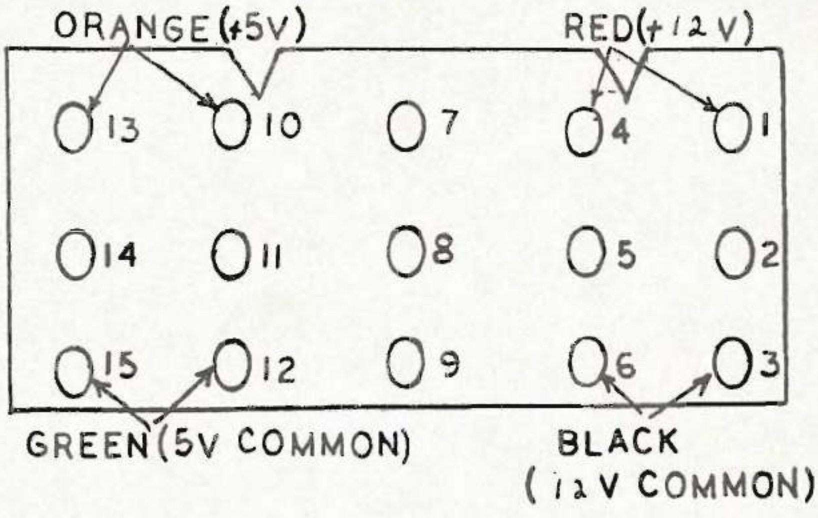








TUNNEL MOLEX



(GREEN IS <u>BROWN</u> INSIDE OF TUNNEL)

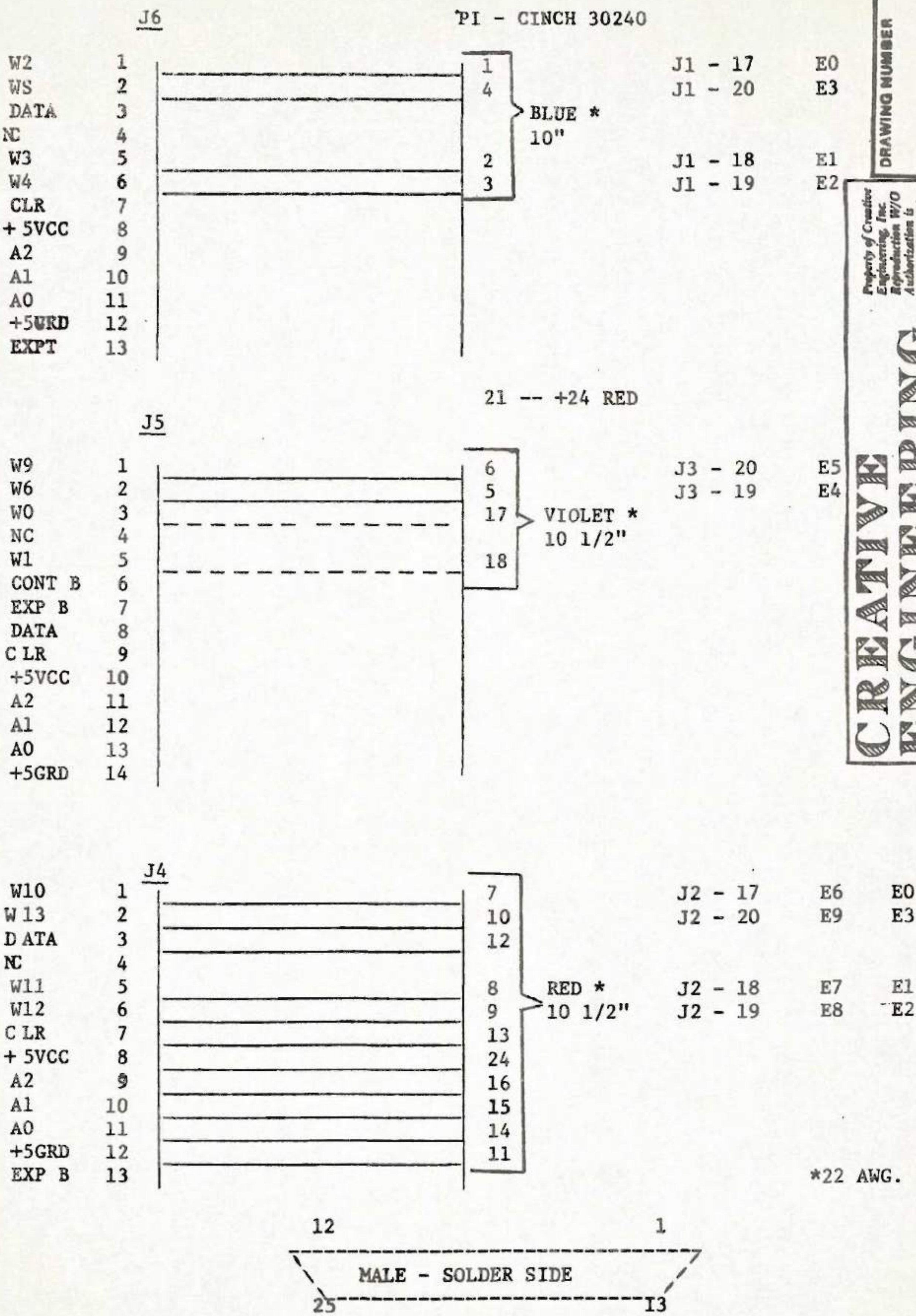
RED 1,4

BLACK 3,6

ORANGE 10, 13

GREEN 12,15

7/19/83
KJ



OUTPUTS........PLAYBACK BOARD WIRING

WIRE LIST FOR COMMON TUNNEL WIRING FOR

BOTH TOP & BOTTOM DRAWERS

FROM	DESC.	TO	TO	TO
		(GREEN 22 AWG)		
J4 - 14	A0	J3 - 47	J2 - 47	J1 - 47
J4 - 15	A1	J3 - 46	J2 - 46	J1 - 46
J4 - 16	A2	J3 - 45	J2 - 45	J1 - 45
J4 - 13	CLR	J3 - 22	J2 - 22	J1 - 22
J4 - 12	DATA	J3 - 21	J2 - 21	J1 - 21
J4 - 1	W2			J1 - 17
J4 - 2	W3			J1 - 18
J4 - 3	W4			J1 - 19
J4 - 4	W5			J1 - 20
J4 - 5	W6		J2 - 17	
J4 - 6	W9		J2 - 18	
J4 - 7	W10		J2 - 19	
J4 - 8	W11		J2 - 20	
J4 - 9	W12	J3 - 17		
J4 - 10	W13	J3 - 18		
J4 - 17	W0	J3 - 19		
J4 - 18	W1	J3 - 20		

THESE ARE OUTPUTS FROM PLAYBACK BOARD WHICH CONTROL THE DISTRIBUTION OF DATA TO THE OUTPUT DRIVER BOARDS:

POWER AND GROUND DISTRIBUTION ARE NOT SHOWN!

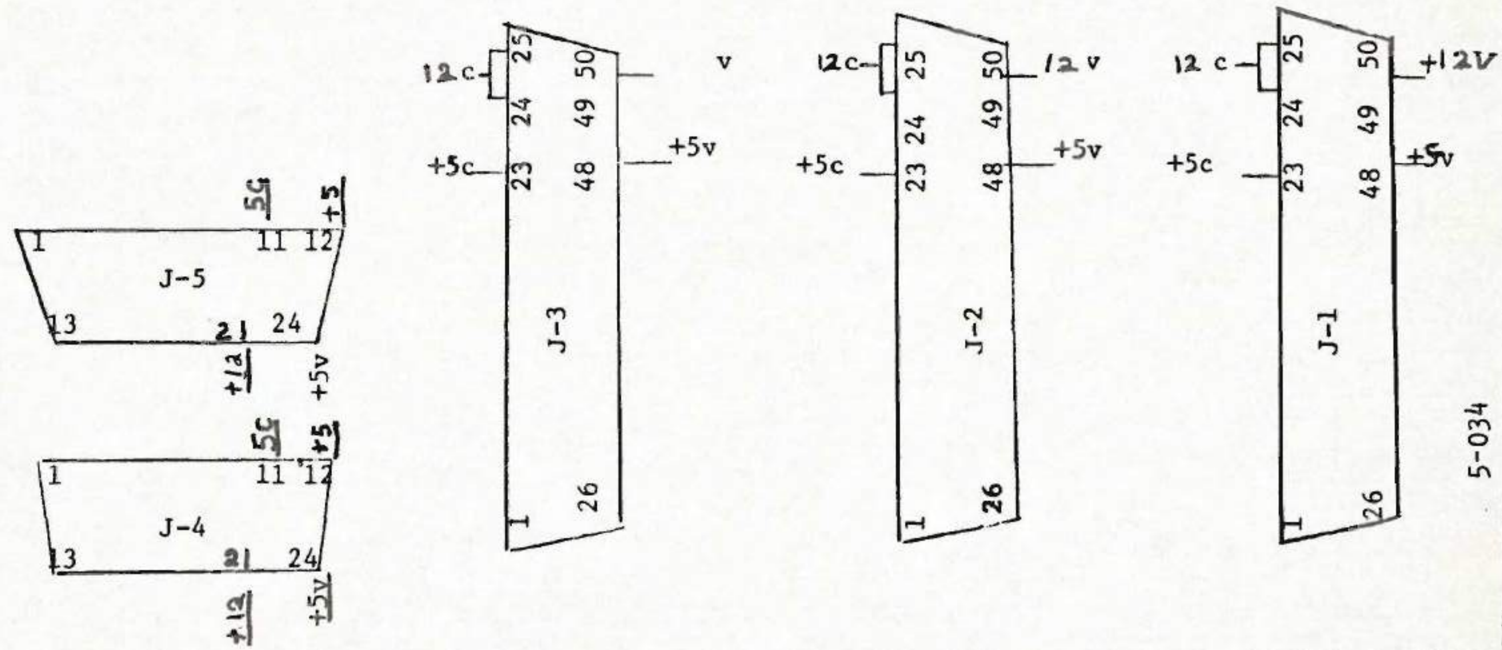
96 CHANNEL CONTROLLER
REAR SIDE, FRONT TUNNEL
LMR 8-2-80

DRAWING NUMBER

CREATIVE ENGINEERING INC

J1 - LONG DRIVER #1 CHANNELS 1 - 32
J2 - LONG DRIVER #2 CHANNELS 33 - 64
J3 - LONG DRIVER #3 CHANNELS 65 - 96
J4 - PLAYBACK BOARD
J5 - ACCESSORY IN/OUT

PINS SHOWN ARE FOR POWER DISTRIBUTION



96 CHANNEL CONTROLLER
REAR SIDE - FRONT TUNING
LMR 8-2-80

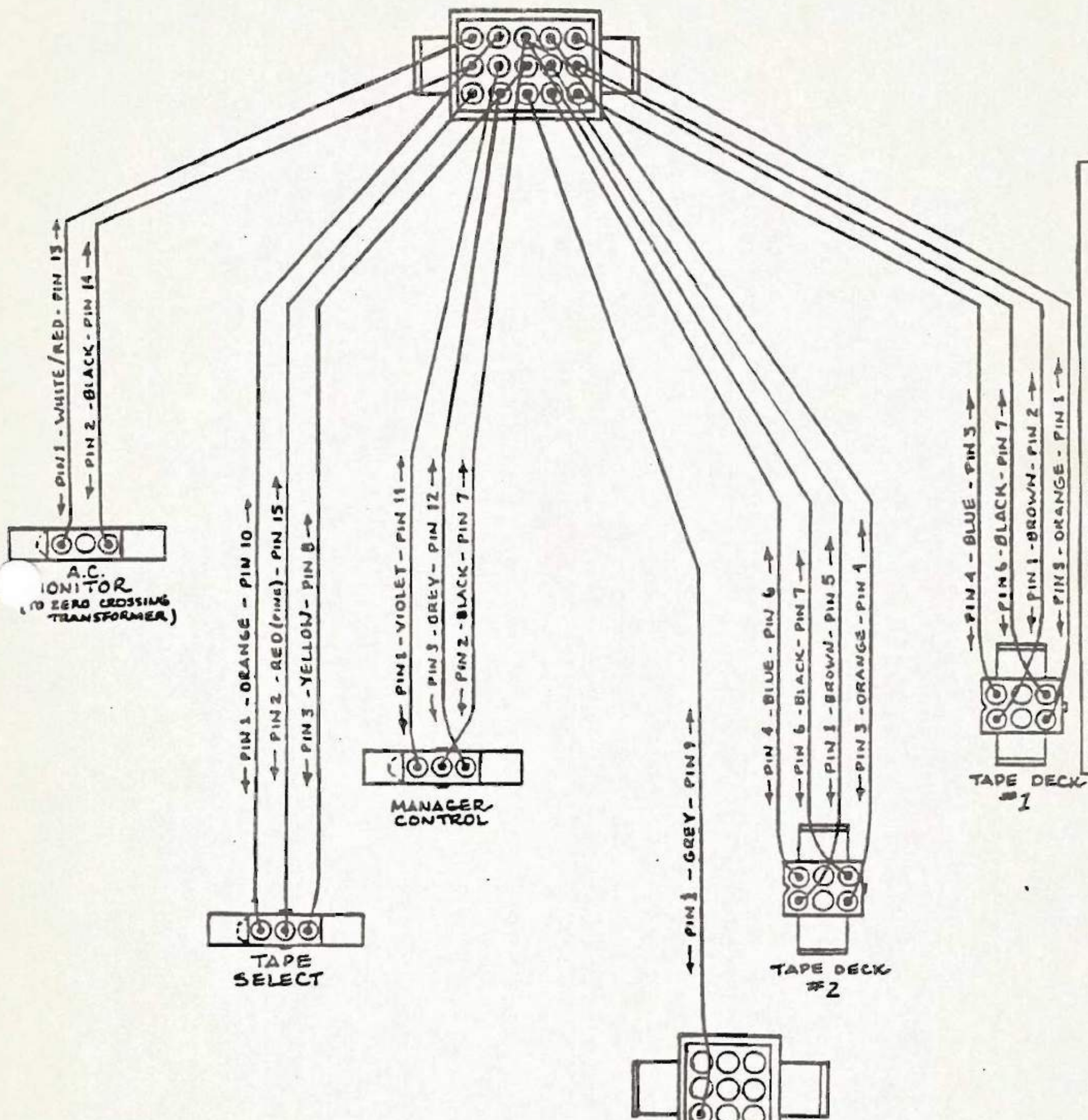
CREATIVE ENGINEERING INC

DRAWING NUMBER

J-13 INTERFACE

P-13	Signal	Color	Pin	To
1	RWND	ORA	3	TO TAPE UNIT #1
2	PLA	BRN	1	
3	STOP	BLU	4	
7	COM	BLK	6	
4	RWND	ORA	3	TO TAPE UNIT #2
5	PLA	BRN	1	
6	STOP	BLU	4	
7	COM	BLK	6	
10	TAPE SEL	ORA	1	TO TAPE Select UNIT
15	+24V	RED	2	
8	BACKGROUND MUSIC	YEL	3	
13	AC REF	WHT/RED	1	TO XMFR
14	24V COM	BLK	3	
11	PLAY	VIOL	1	TO MGR CONTROL
7	5V COM	BLK	2	
12	NOR/SPEC	GRY	3	
9			1	To Dual Pressure J14

J-13 INTERFACE WIRING AND PIN DIAGRAM



✱ ONLY ON '82 AND NEWER EQUIPMENT.

FROM		TO		CHARACTER: Wolf & Dum		FROM		TO		CHARACTER: Wolf & Dum	
J#	Pin	J#	Pin	Bit #	Function	J#	Pin	J#	Pin	Bit #	Function
J1	1	J6	1	1	Mouth	J1	29	J6	17	20	Dummy head tilt.
J1	9	J6	2	9	L. Ear	J2	4	J6	18	36	Dummy mouth
J1	10	J6	3	10	R. Ear	J2	5	J6	19	37	Dummy eyebrow
J1	2	J6	4	2	L. Eye Lid	J1	14	J6	20	14	Body twist L
J1	3	J6	5	3	R. Eye Lid	J1	15	J6	21	15	Body twist R
J1	4	J6	6	4	Eyes L	J1	16	J6	22	16	Body Lean
J1	5	J6	7	5	Eyes R						
J1	6	J6	8	6	Head L						
J1	7	J6	9	7	Head R						
J1	8	J6	10	8	Head Up						
J1	11	J6	11	11	L Arm Raise						
J1	12	J6	12	12	L Arm Twist						
J1	13	J6	13	13	L Elbow						
J1	26	J6	14	17	R Arm Raise						
J1	27	J6	15	18	R. Arm Twist						
J1	28	J6	16	19	R Elbow Twist						

5-037

Drawer Top (Master)

Show Rock-AFire

Date 8/4/80 Rev. 8/30/83

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Duke		FROM		TO		CHARACTER: Gorilla	
J#	Pin	J#	Pin	Bit #	Function	J#	Pin	J#	Pin	Bit #	Function
J1	39	J7	1	30	Mouth	J2	13	J8	1	45	Mouth
J1	32		2	23	L Ear		9		2	41	L. Lid
J1	33		3	24	R Ear		10		3	42	R. Lid
J1	35		4	26	L Lid		11		4	43	Eyes L
J1	36		5	27	R Lid		12		5	44	Eyes R
J1	37		6	28	Eyes L		31		6	54	Head L
J1	38		7	29	Eyes R		32		7	55	Head R
J1	34		8	25	Head L		28		8	51	Head Tip L
J1	30		9	21	Head R		29		9	52	Head Tip R
J1	31		10	22	Head Up		30		10	53	Head Up
J2	1		11	33	L Arm Swing		34		11	57	L Arm Swing
J2	2		12	34	R Arm Swing		35		12	58	R Arm Swing
J2	3		13	35	L Elbow		36		13	59	L Elbow
J1	40		14	31	R Elbow		37		14	60	R Elbow
J1	41		15	32	High Hat		38		15	61	Foot Tap
J2	40		16	63	Bass Foot		39		16	62	Body Lean
J1	41		17	64	Body Lean						

5-038

Date 8/4/80

Drawer Top (Master)

Show Rock-AFire Rev. 8/30/83

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Organ		FROM		TO		CHARACTER: Sign	
J#	Pin	J#	Pin	Bit#	Function	J#	Pin	J#	Pin	Bit #	Function
J3	2	J10	1	66	Top - Blue	J3	12	J10	10	76	Inner GRP
	3		2	67	Red		13		11	77	Mid GRP
	4		3	68	Amber		14		12	78	Outer GRP
	5		4	69	Green		15		13	79	Cont Strobe
	7		5	71	Leg - Top	↓	16	↓	14	80	Flash Strobe
	8		6	72	Mid						
	9		7	73	Bottom						
	10		8	74	Cont Strobe						
↓	11	↓	9	75	Flash Strobe						

5-039

Drawer Top (Master)

Show Rock-AFire

Date 8/4/80 Rev. 8/30/83

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Spots		FROM		TO		CHARACTER: Curtains	
J#	Pin	J#	Pin	Bit#	Function	J#	Pin	J#	Pin	Bit #	Function
J3	26	J11	1	81	# 1 Mitzi						
	27		2	82	2						
	28		3	83	3 Looney Bird						
	29		4	84	4 Billy Bob						
	30		5	85	5 Fatz						
	31		6	86	6						
	32		7	87	7						
	33		8	88	8						
J3	34	J5	1	89	SR OPN	J5	13	J 11	14	89	SR OPN
	35		2	90	SR CLS		14		15	90	SR CLS
	36		3	91	CS CLS		15		16	91	CS OPN
	37		4	92	CS CLS		16		17	92	CS CLS
	38		5	93	SL OPN		17		18	93	SL OPN
	39		6	94	SL CLS		18		19	94	SL CLS

5-040

Drawer Top (Master)

Show Rock-AFire

Date 8/4/80 Rev. 8/30/83

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Props		FROM		TO		CHARACTER:	
J#	Pin	J #	Pin	Bit #	Function	J#	Pin	J#	Pin	Bit#	Function
J2	6	J9	1	38	Sun Mouth						
↓	7	↓	2	39	Sun Raise						
↓	8	J14	1	40	Dual Pressure						
↓	14	↓	4	46	Moon Mouth						
↓	15	↓	5	47	Moon Raise						
↓	16	↓	6	48	Looney Bird Hands						
↓	26	↓	7	49	Spider						
↓	27	↓	8	50	Baby Bear						

5-041

Drawer Top (Master)

Show Rock-AFire

Date 8/4/80 Rev 8/30/83

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Bear		FROM		TO		CHARACTER: Bird	
J#	Pin	J#	Pin	Bit#	Function	J#	Pin	J#	Pin	Bit#	Function
J1	16	J6	1	16	Mouth	J1	26	J7	1	17	Mouth
	1		2	1	L. Lid	J2	9		2	41	L. Lid
	2		3	2	R. Lid	J2	10		3	42	R. Lid
	3		4	3	Eyes Cross	J2	11		4	43	Eyes Cross
	6		5	6	Head L	J1	30		5	21	Head L
	7		6	7	Head R	J1	31		6	22	Head Raise
	8		7	8	Head Up						
	11		8	11	R Arm Raise						
	12		9	12	R Arm Twist						
	13		10	13	R Elbow Twist						
	14		11	14	R Wrist						
	4		12	4	L Hand Slide						
	5		13	5	Guitar Raise						
	9		14	9	L Leg Kick						
	10		15	10	R Leg Kick						
	15		16	15	Body Lean						

5-042

Show: Rock-AFire

Drawer: Bottom (Accessory)

Date: 8/5/80 Rev. 8/30/83

CREATIVE ENGINEERING INC.

DRAWING NUMBER

FROM		TO		CHARACTER: Mitzi		FROM		TO		CHARACTER:	
J#	Pin	J#	Pin	Bit#	Function	J#	Pin	J#	Pin	Bit#	Function
J2	3	J8	1	35	Mouth	J2	4	J8	17	36	Body Twist L
J1	35		2	26	L. Ear		5		18	37	Body Twist R
	36		3	27	R. Ear		6		19	38	Body Lean
	40		4	31	L. Lid						
	41		5	32	R. Lid						
J2	1		6	33	Eyes L						
	2		7	34	Eyes R						
J1	37		8	28	Head L						
	38		9	29	Head R						
	39		10	30	Head Up						
	32		11	23	L. Arm Raise						
	27		12	18	R. Arm Raise						
	33		13	24	L. Elbow						
	28		14	19	R. Elbow						
	34		15	25	L. Arm Twist						
	29		16	20	R. Arm Twist						

5-043

Show Rock-AFire

Date 8/5/80 Rev. 8/30/83

Drawer Bottom (Accessory)

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Billy Bob	
J#	Pin	J#	Pin	Bit#	Function
J2	14	J9	1	46	Mouth
↓	15	↓	2	47	L. Lid
	16		3	48	R. Lid
	26		4	49	Eyes L
	27		5	50	Eyes R
	28		6	51	Head L
	29		7	52	Head R
	30		8	53	Head Tip L
	31		9	54	Head Tip R
	32		10	55	Head Up
	7		11	39	L Hand Slide
	33		12	56	R Arm Raise
	34		13	57	R Arm Twist
	35		14	58	R Elbow Twist
	36		15	59	R Wrist
↓	8	↓	16	40	Guitar Raise

FROM		TO		CHARACTER:	
J#	Pin	J#	Pin	Bit#	Function
J2	38	J9	17	61	Body Twist L
↓	39	↓	18	62	Body Twist R
	12		19	44	Foot Tap
↓	40	↓	20	63	Body Lean

5-044

Drawer Bottom (Accessory)

Show Rock-AFire

Date 8/5/80 Rev. 8/30/83

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Floods & House		FROM		TO		CHARACTER: Specials	
J#	Pin	J#	Pin	Bit #	Function	J#	Pin	J#	Pin	Bit #	Function
J3	2	J10	1	66	SR Blue	J2	41	J5	2	64	Stop
	3		2	67	" Green		1		3	65	Rewind
	4		3	68	" Amber		37	J13	9	60	Dual Pressure
	5		4	69	" Red						
	7		5	71	CS Blue						
	8		6	72	" Green						
	9		7	73	" Amber						
	10		8	74	" Red						
	12		9	76	SL Blue						
	13		10	77	" Green						
	14		11	78	" Amber						
	15		12	79	" Red						
J5	13	J10	13	-	House Lights 1						
	14		14	-	" " 2						
	15		15	-	" " 3						
	16		16								

Drawer Bottom (Accessory)

Show Rock-AFire

Date 8/5/80 Rev. 8/30/83

5-045

CREATIVE ENGINEERING INC

DRAWING NUMBER

FROM		TO		CHARACTER: Stage Lights			FROM		TO		CHARACTER:		
J#	Pin	J#	Pin	Bit #	Function	CKT #	J#	Pin	J#	Pin	Bit #	Function	CKT #
J3	39	J11	1	94	Rainbow	1	J3	34	J 11	17	89	Moon Spot	17
	40		2	95	"	2		35		18	90	Spider Spot	18
	6		3	70	Applause	3		41		19	96	Beach Bear Spot	19
	26		4	81	Backdrop	4							
	27		5	82	"	5							
	28		6	83	"	6							
	29		7	84	Tree Line	7							
	30		8	85	" "	8							
	31		9	86	Bushes	9							
	32		10	87	"	10							
	11		11	75	Drums	11							
	36		12	91	Gas Pump	12							
	37		13	92	Service Sta	13							
	38		14	93	"	14							
	16		15	80	Fire/Still	15							
	33		16	88	Sun Spot	16							

5-046

Drawer Bottom (Accessory)

Show Rock-AFire

Date 8/5/80 Rev. 8-30-83

CREATIVE ENGINEERING INC

DRAWING NUMBER

DUAL P.C.

PC INTERCONNECT

Group	PC-1	Signal	J-5	J-10	J-13
HOUSE LIGHT DIM	C		13	13	
	D		14	14	
	E		15	15	
	GND.		16	16	
	5	AC REF IN	12		13
	K	BACKGROUND MUSIC	1		8
	3 (PC-2)	DIM/BRIGHT		J2-37	9
	N (PC-2)				
TAPE CONTROL BOARD	3	$\overline{\text{STPIN}}$	2	J2-41	
	4	$\overline{\text{RWDIN}}$	3	J3-1	
	5	$\overline{\text{MGR PLA}}$	18		11
	6	$\overline{\text{NOR/SPEC}}$		19	12
	S	$\overline{\text{TAPSEL}}$	4		10
	C	$\overline{\text{RWND 1}}$	5		1
	D	$\overline{\text{PLA 1}}$	6		2
	E	$\overline{\text{STP 1}}$	7		3
	J	$\overline{\text{RWND 2}}$	8		4
	K	$\overline{\text{PLA 2}}$	9		5
	L	$\overline{\text{STP 2}}$	10		6

	J-13
24V Com	14
+24V	15
5V COM	7

EACH BOARD:
1 & A = +5V
22 & Z = GRD

DRAWING NUMBER

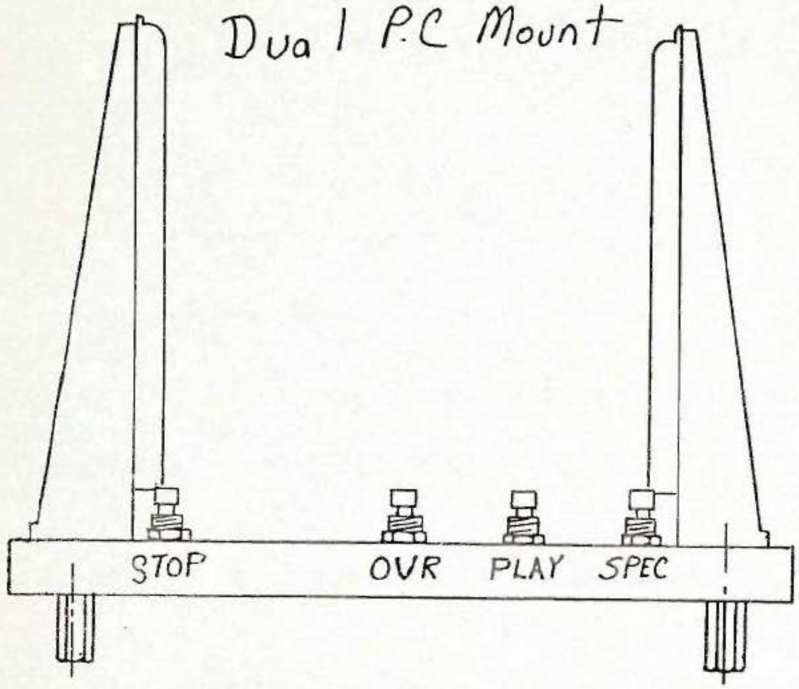
SINGLE P.C.

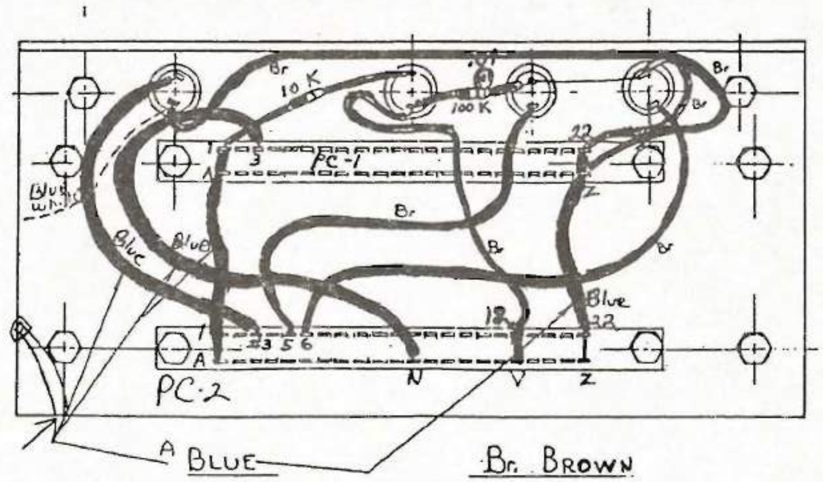
PC INTERCONNECT (CURT.)

PC-1		J-5
2	ST RIGHT OP IN	1
3	SR CLS IN	2
5	CS OP IN	3
6	CS CLS IN	4
8	SL OP IN	5
9	SL CLS IN	6
B	SR OP OUT	3
C	SR CLS OUT	4
E	CS OP OUT	5
F	CS CLS OUT	6
J	SL OP OUT	7
K	SL CLS OUT	8
1&A	+5V	4
16	+24V	1
22&Z	5VCOMM	1

STOCK	MAT'L.

Dual P.C Mount





5-049

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	PRODUCTION APP. DATE			
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY
REV. / DATE / BY			DATE:	CHK'D. BY
	ITEM: Dual P.C. Mount			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER

P 1		P 2
1	BROWN	1
2	RED	2
3	ORANGE	3
4	YELLOW	4
5	GREEN	5
6	BLUE	6
7	VIOLET	7
8	GREY	8
9	WHITE	9
10	BLACK	10
11	TAN	11
12	WHITE/RED	12
13	PINK	13
14	WHITE/YELLOW	14
15	WHITE/GREEN	15
16	WHITE/BLUE	16
17	RED/BLACK	17
18	RED/YELLOW	18
23	RED/GREEN	23
24	WHITE/BLACK	24

P1 & P2 ARE CINCH/AMPHENOL 57-30240

WIRING DIAGRAM
20 COND. CABLE
LMR 12-23-80

P 1		P22
1	BROWN	1
2	RED	2
3	ORANGE	3
4	YELLOW	4
5	GREEN	5
6	BLUE	6
7	VIOLET	7
8	GREY	8
9	WHITE	9
10	BLACK	10
11	WHITE/BROWN	11
12	WHITE/RED	12
13	WHITE/ORANGE	13
14	WHITE/YELLOW	14
15	WHITE/GREEN	15
16	WHITE/BLUE	16
17	WHITE/VIOLET	17
18	WHITE/GREY	18
19	WHITE/BLACK/PINK	19
20	WHITE/BLACK	20
21	TAN	21
22	RED/BLACK	22
23	RED/YELLOW	23
24	RED/GREEN	24
	PINK	

P1 & P2 ARE TYPE 57-30240 CONNECTORS

WIRING DIAGRAM
25 COND. CABLE
LMR 12-23-80

P 1		P 2
1	BROWN	1
2	RED	2
3	ORANGE	3
4	YELLOW	4
5	GREEN	5
6	BLUE	6
7	VIOLET	7
8	GREY	8
23	WHITE	23
24	BLACK	24

P1 & P2 ARE TYPE 57-30240 CONNECTORS

WIRING DIAGRAM
10 COND. CABLE

LMR 12-23-80

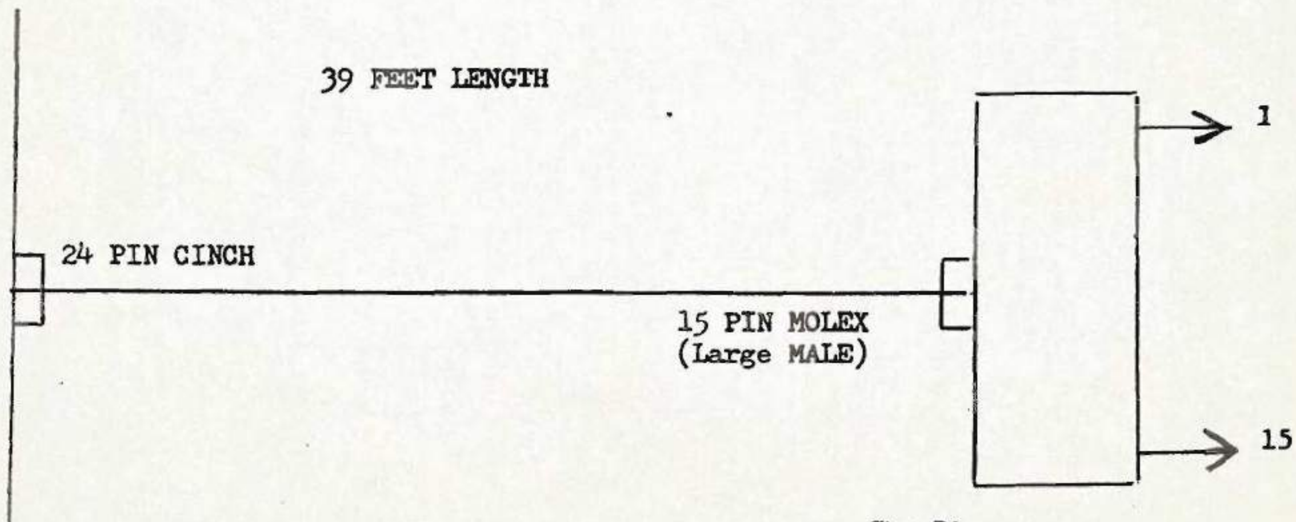
PIN OUTS	FLOODS	
J10 - 1	1	MOLEX 9 PIN
J10 - 2	2	TO BOX 2
J10 - 3	3	
J10 - 4	4	
J10 - 5	5	
J10 - 6	6	
J10 - 7	7	
J10 - 8	8	
J10 - 23	9	

J10 - 9	1	MOLEX 9 PIN
J10 - 10	2	TO BOX 3
J10 - 11	3	5, 6, 7 & 8 HOUSE LIGHTS
J10 - 12	4	
J10 - 13	5	
J10 - 14	6	
J10 - 15	7	
J10 - 16	8	
J10 - 24	9	

J11 - 1	1	STAGE LIGHTS
J11 - 2	2	DMB 25 PIN CONNECTOR
J11 - 3	3	
J11 - 4	4	
J11 - 5	5	
J11 - 6	6	
J11 - 7	7	
J11 - 8	8	
J11 - 9	9	
J11 - 10	10	
J11 - 11	11	
J11 - 12	12	
J11 - 13	13	
J11 - 14	14	
J11 - 15	15	
J11 - 16	16	
J11 - 17	17	
J11 - 18	18	
J11 - 19	19	
J11 - 23	24	
J11 - 24	25	

ORGAN 24 PIN HOODED CINCH	15 PIN MOLEX RECEPTACLE Large FEMALE
1. BROWN	1
2. RED	2
3. ORANGE	3
4. YELLOW	4
5. GREEN	5
6. BLUE	6
7. VIOLET	7
8. GRAY	8
9. WHITE	9
10. BLACK	10
11. TAN	11
12. WHITE/RED	12
13. PINK	13
14. WHITE/YELLOW	14
23,24 W/B & R/G & R/Y	15

J-10



ShowBiz
Organ/Sign Cable

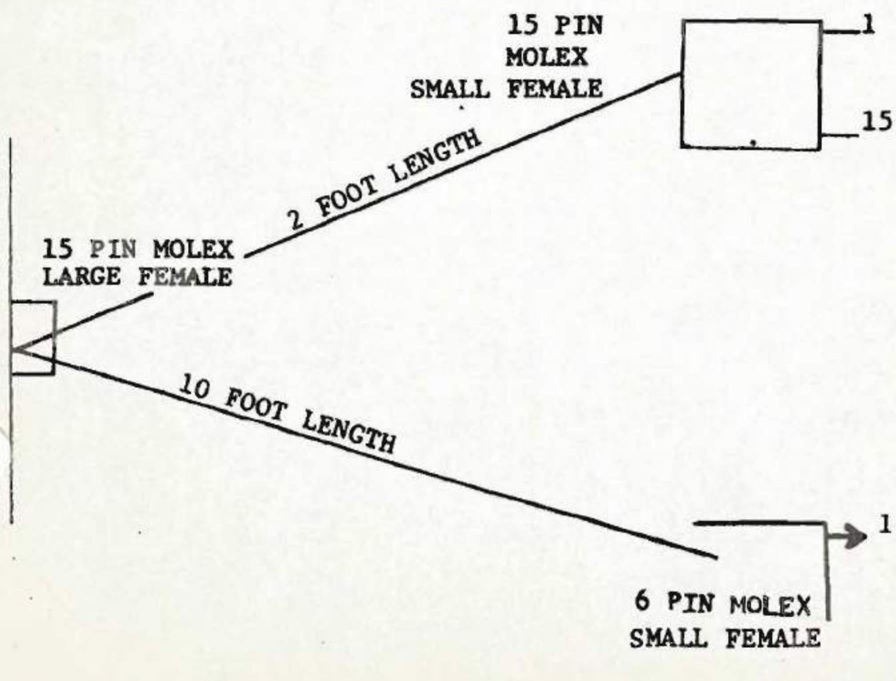
15 PIN MOLEX - LARGE FEMALE PIN

	BROWN		1
2	RED		2
3	ORANGE		3
4	YELLOW		4
5	GREEN		5
6	BLUE		6
7	VIOLET		7
8	GREY		8
9	WHITE		9
15	BLACK		15

Pins 1–9 and 15 above go to: 15 PIN MOLEX SMALL FEMALE RECEPTACLE

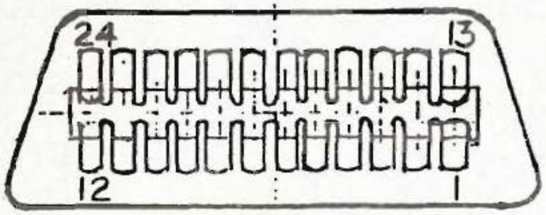
10	BROWN	BROWN	1
	RED	RED	2
12	ORANGE	ORANGE	3
13	YELLOW	YELLOW	4
14	GREEN	GREEN	5
	WHITE & BLACK	WHITE & BLACK	6

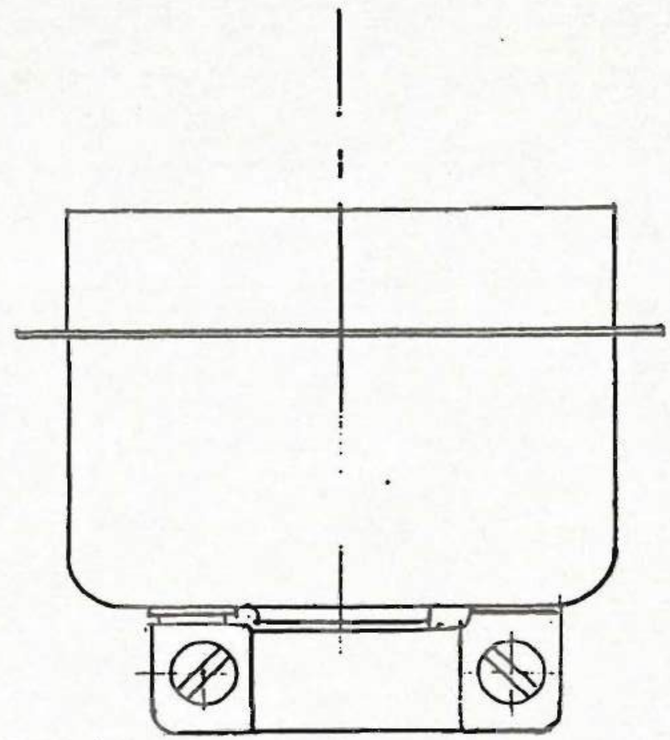
Pins 1–5 above go to: 6 PIN MOLEX SMALL FEMALE RECEPTACLE



SHOWBIZ
ORGAN/Sign CABLE
CREATIVE ENGINEERING, INC.
LMR 11-05-80

NEW COLOR CODE





24 Cond.

1....Brown	13....White/Orange
2....Red	14....White/Yellow
3....Orange	15....White/Green
4....Yellow	16....White/Blue
5....Green	17....White/Violet
6....Blue	18....White/Gray
7....Violet	19....White/Bl/Pink OR RED
8....Gray	20....White/Bl
9....White	21....Tan
10....Black	22....Red/Black
11....White/Brown	23....Red/Yellow
12....White/Red	24....Red/Green

Alternate

25....White/Pink

5-056

AMPHENOL CONNECTOR		
SCALE: 2 x SIZE	APPROVED BY	DRAWN BY
DATE: 4-28-92		Carl R.
		DRAWING NUMBER

PRINTED BOARD WIRING

FOR ORGAN

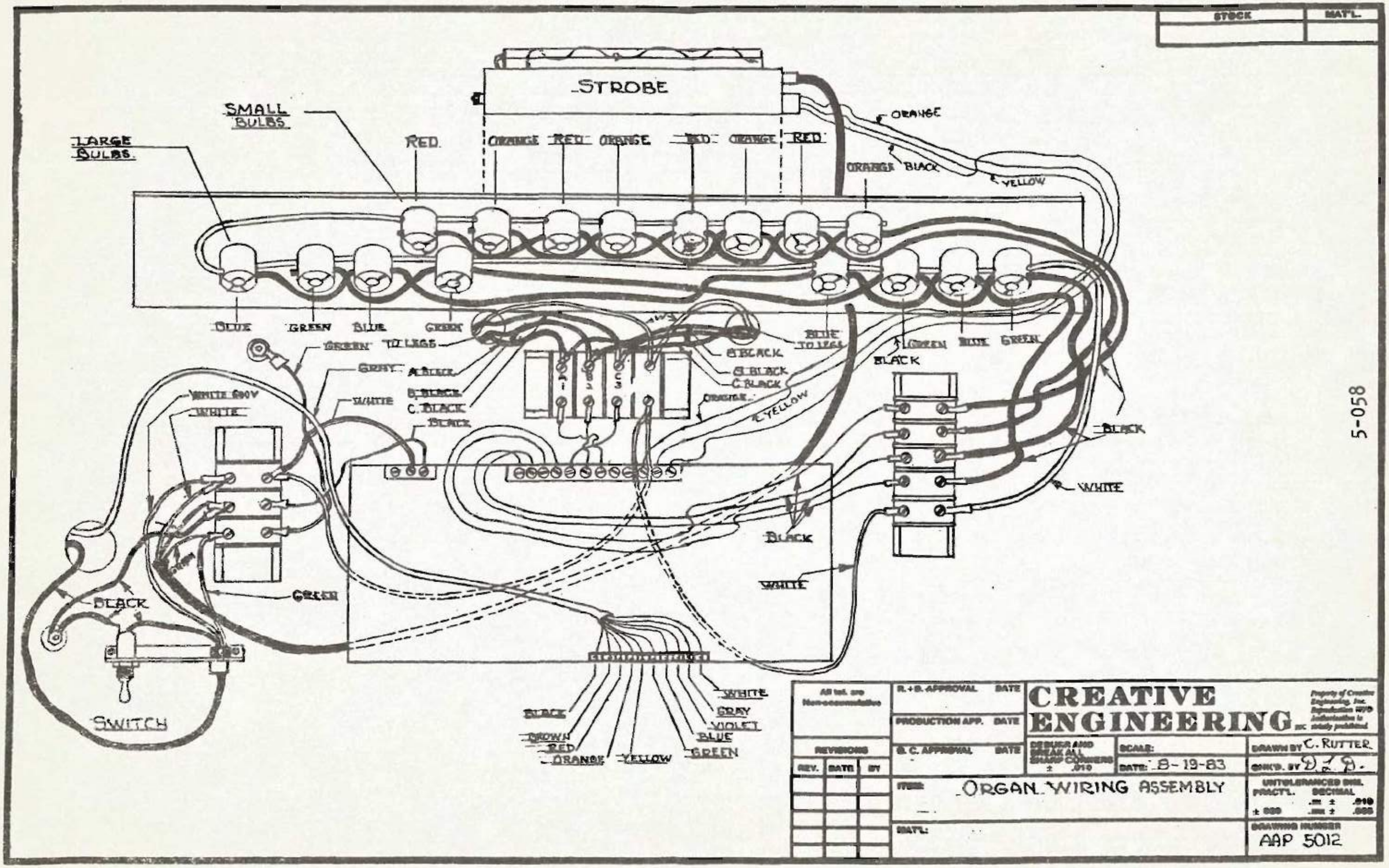
MOLEX PIN #	FUNCTION	12 PIN BARRIER #
1	BLUE	12
2	RED	11
3	AMBER	10
4	GREEN	9
5	LEG - TOP	8
6	LEG - MIDDLE	7
7	LEG - BOTTOM	6
8	CONTINUOUS-STROBE	3
9	FLASH STROBE	2
NONE	STROBE COMMON	1
15	+ 24 VOLTS	

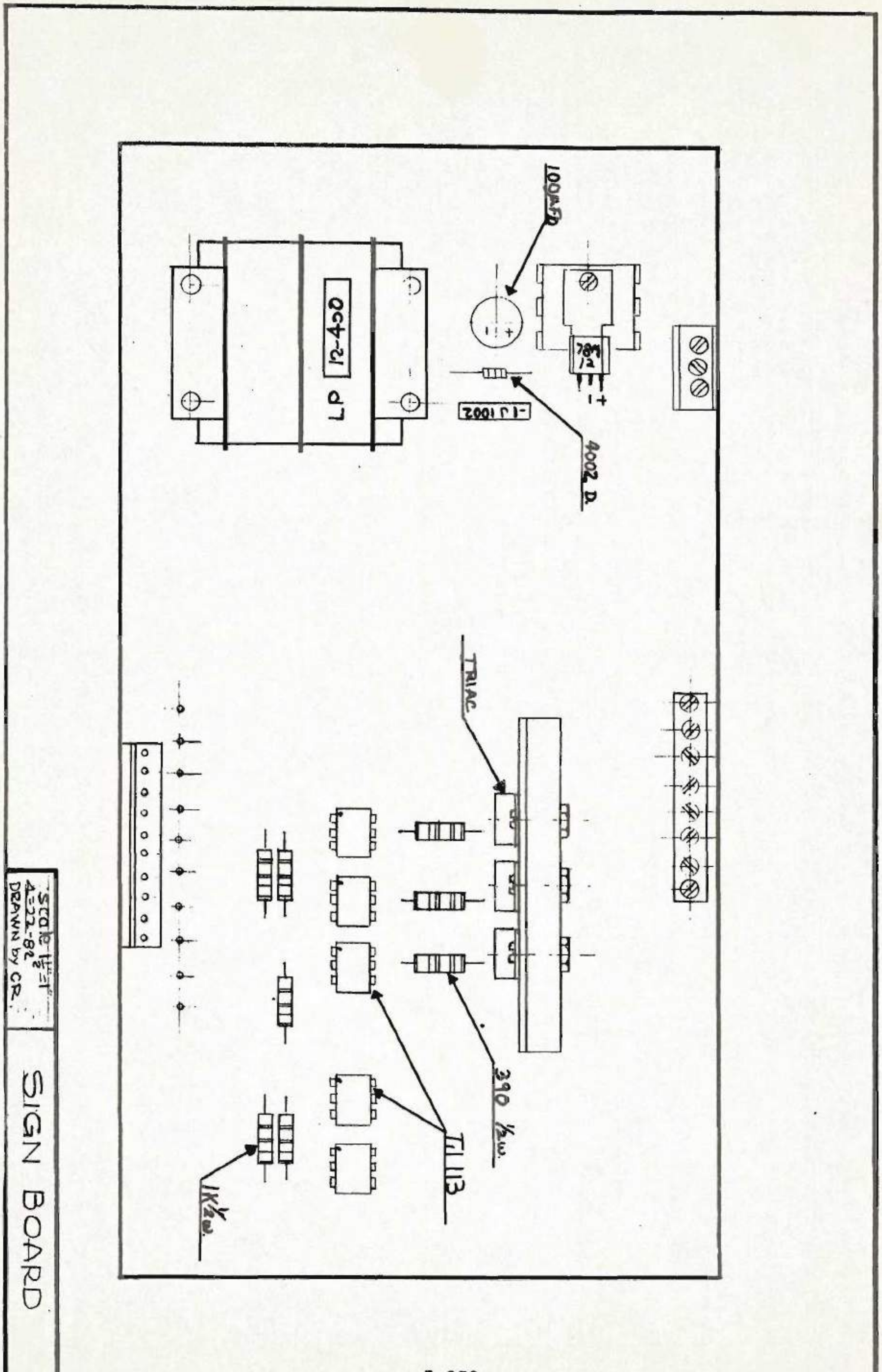
AC - BLACK (L 1) TO PIN 1
WHITE (L 2) TO PIN 2

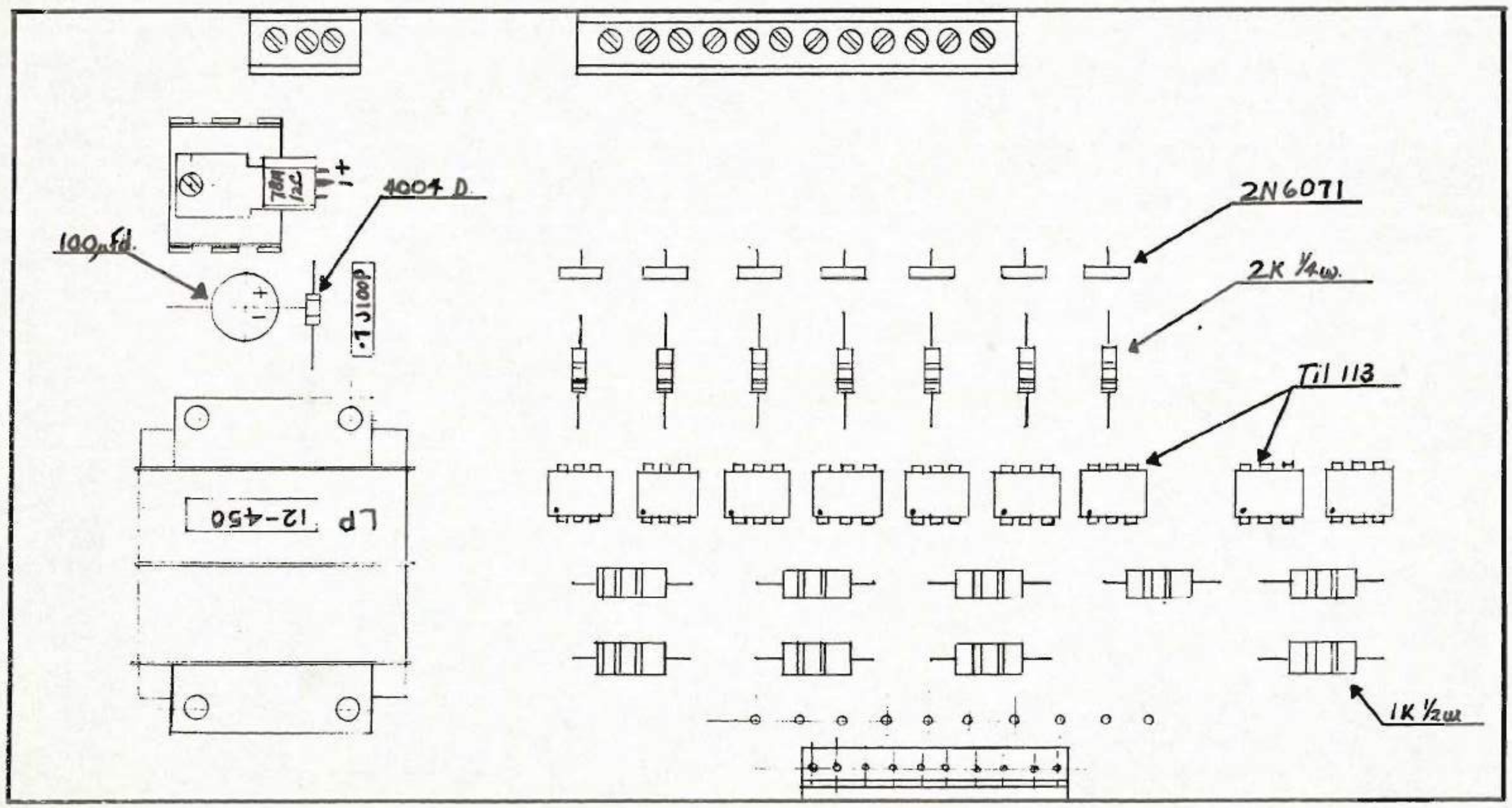
SIGN

MOLEX PIN #	FUNCTION	8 PIN BARRIER #
1	INNER GROUP	8
2	MIDDLE GROUP	7
3	OUTER GROUP	6
4	CONTINUOUS-STROBE	3
5	FLASH STROBE	2
	STROBE COMMON	1
6	+ 24 VOLTS	

AC - BLACK (L 1) TO PIN 1 OF 3 PINS
BARRIER, WHITE (L 2) TO PIN 2


STROBE
SMALL BULBS
LARGE BULBS
RED.
ORANGE
RED
ORANGE
RED
ORANGE
RED
ORANGE
BLACK
YELLOW
BLUE
GREEN
BLUE
GREEN
GREEN TO LEGS
GRAY
A BLACK
B BLACK
C BLACK
BLACK
WHITE 600V
WHITE
B BLACK
B BLACK
C BLACK
BLUE TO LEGS
GREEN
BLUE
GREEN
BLACK
ORANGE
YELLOW
BLACK
WHITE
BLACK
WHITE
GREEN
BLACK
SWITCH
BLACK
BROWN
RED
ORANGE
YELLOW
GREEN
BLUE
VIOLET
GRAY
WHITE
STOCK
MAT'L.
All tol. are Non-accumulative
R.+D. APPROVAL DATE
PRODUCTION APP. DATE
Q. C. APPROVAL DATE
REVISIONS
REV. DATE BY
CREATIVE ENGINEERING INC
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DEBURR AND BREAK ALL SHARP CORNERS ± .010
SCALE:
DATE: 8-19-83
DRAWN BY C. RUTTER
CHK'D. BY D. L. G.
ITEM: ORGAN WIRING ASSEMBLY
MAT'L:
UNTOLERANCED DIM. FRACT'L. DECIMAL
DRAWING NUMBER
AAP 5012


SIGN BOARD
Scale 1½"=1"
4-22-82
DRAWN by CR.
LP 12-450
100µFD
4002 D
TRIAC
390 ½w
TIL113
1K ½w



Scale 1½" = 1"
Date 4-22-82
Drawn by CR

ORGAN DRIVE BOARD

24 PIN HOODED CINCH.

TO J-10 OUTPUT

24 Pin Cinch	Molex Pin	Signal	Group
1	10	BLUE	TOP
2	13	RED	TOP
3	14	AMBER	TOP
4	15	GREEN	TOP
5	7	TOP	LEG
6	8	MID	LEG
7	9	BOTTOM	LEG
8	4	STR COUNT	STROBE
9	6	STR PLSH	STROBE
23	1	+24	
10	4	INNER	
11	5	MID	
12	1	OUTER	
13	3	STR CONT	
14	2	STR FLSH	
24	6	+24	

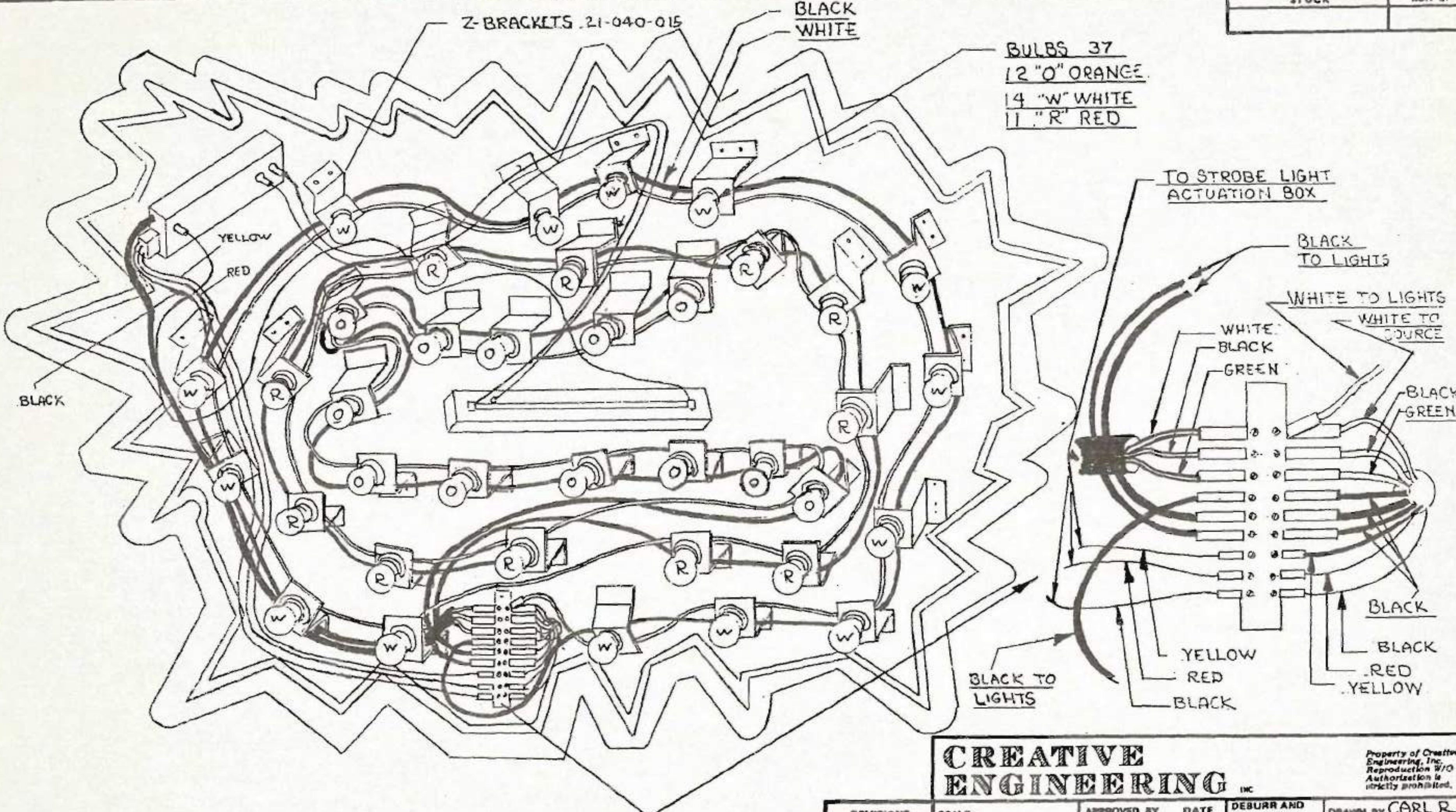
Pins 10, 13, 14, 15, 7, 8, 9, 4, 6, 1: TO ORGAN 15 PIN MOLEX

Pins 4, 5, 1, 3, 2, 6: TO SIGN 6 PIN MOLEX PLUG W/ MALE PINS

5-061

STOCK	MAT'L.

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	PRODUCTION APP. DATE		
REVISIONS: REV. DATE BY	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE: / DATE:	DRAWN BY / CHK'D. BY
	ITEM: ORGAN AND SIGN INTERFACE CABLE		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:		DRAWING NUMBER



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STOCK	MAT'L.

REVISIONS		
REV.	DATE	BY
1	4/83	CR

SCALE:	APPROVED BY	DATE 4/83	DEBURR AND BREAK ALL SHARP CORNERS ± .010
DATE: 6-9-81			
ITEM: ROCK-A-FIRE SIGN WIRING DIAGRAM			
DESCRIPTION:			

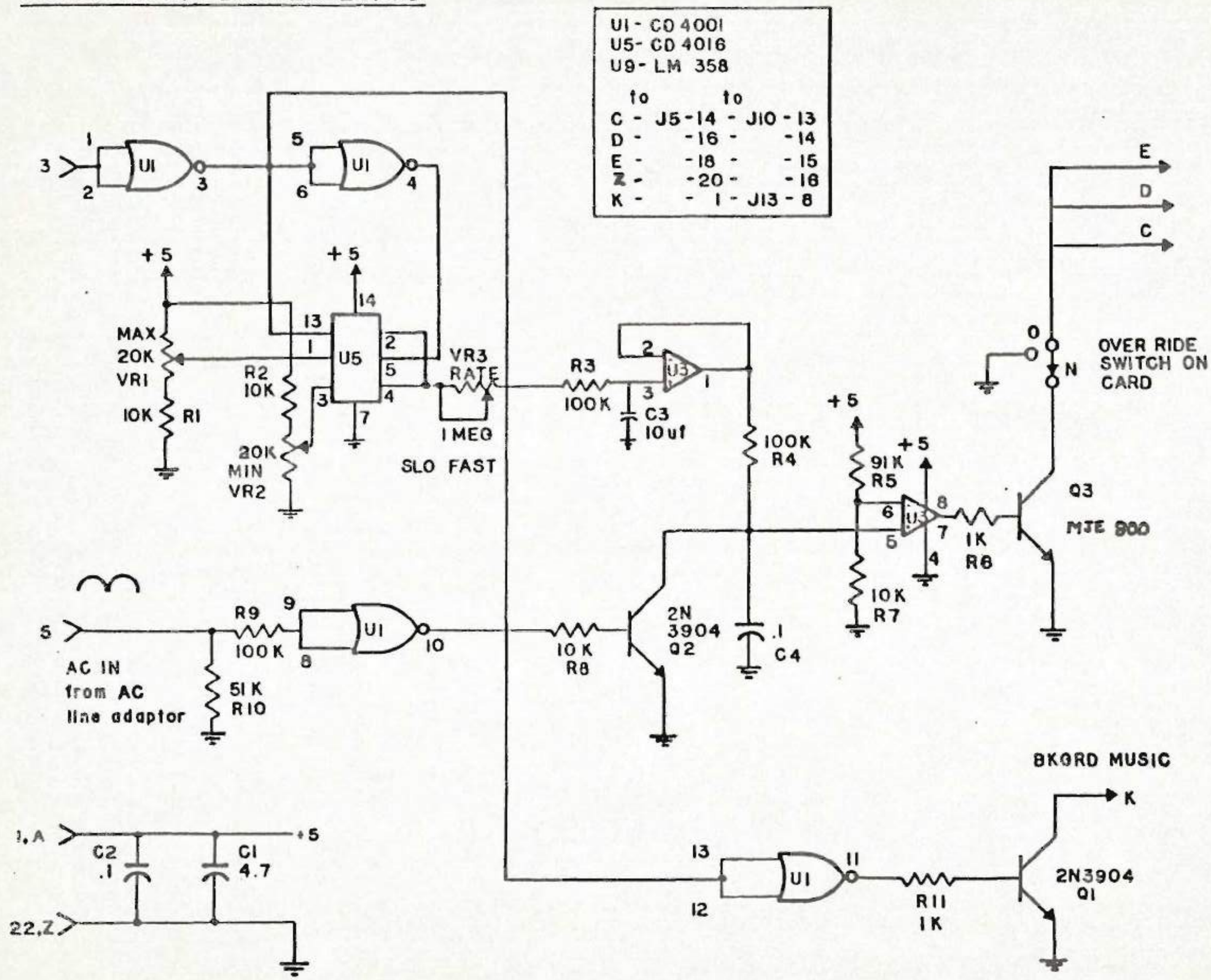
DRAWN BY CARL R.

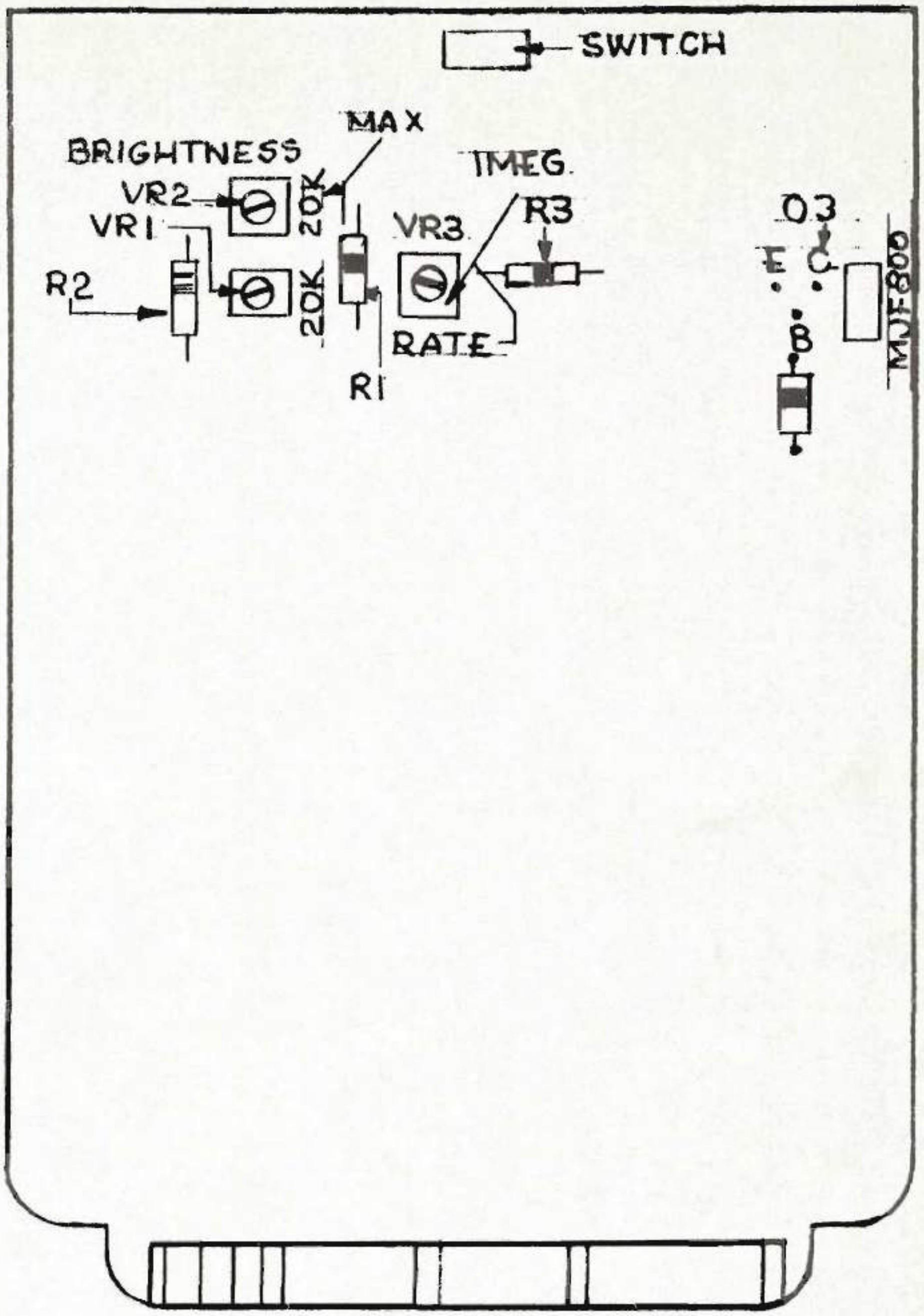
CHK'D. BY

TOLERANCES: FRACT'L. .020 — DECIMAL .xx ± .010, .xxx ± .005

DRAWING NUMBER (AAO 1916)

HOUSE LIGHT DIMMER BOARD





STOCK	MAT'L

All tol. are Non-accumulative

REVISIONS		
REV.	DATE	BY

R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q.C. APPROVAL DATE

ITEM: HOUSE LIGHT DIMMER BOARD.

MAT'L:

CREATIVE ENGINEERING INC

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

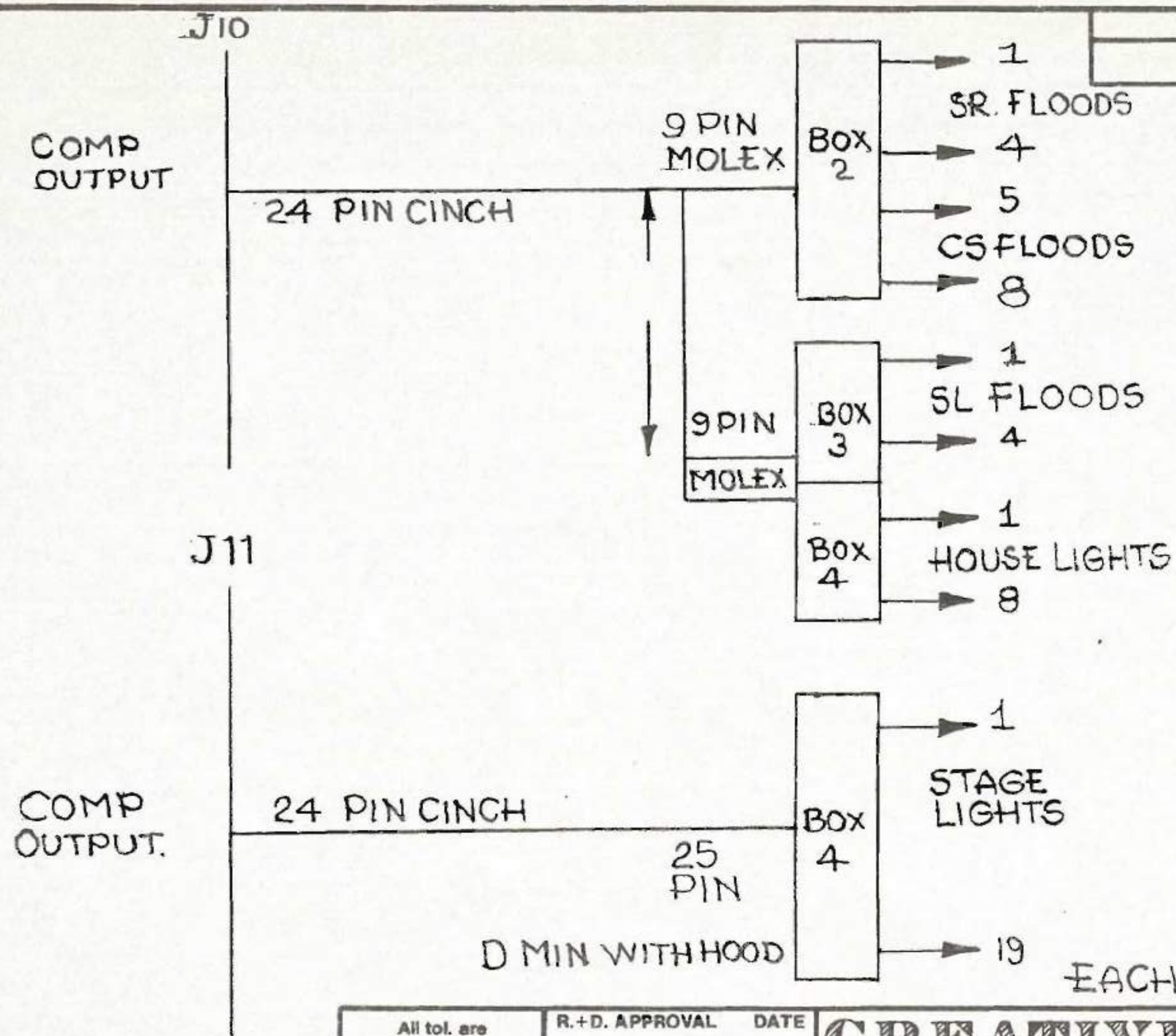
DATE: 7-13-83

DRAWN BY KJ-TR/CR

CHK'D. BY

UNTOLERANCED DIM.
FRACT'L. ± .020
DECIMAL .XX ± .010 .XXX ± .005

DRAWING NUMBER E7[illegible]030



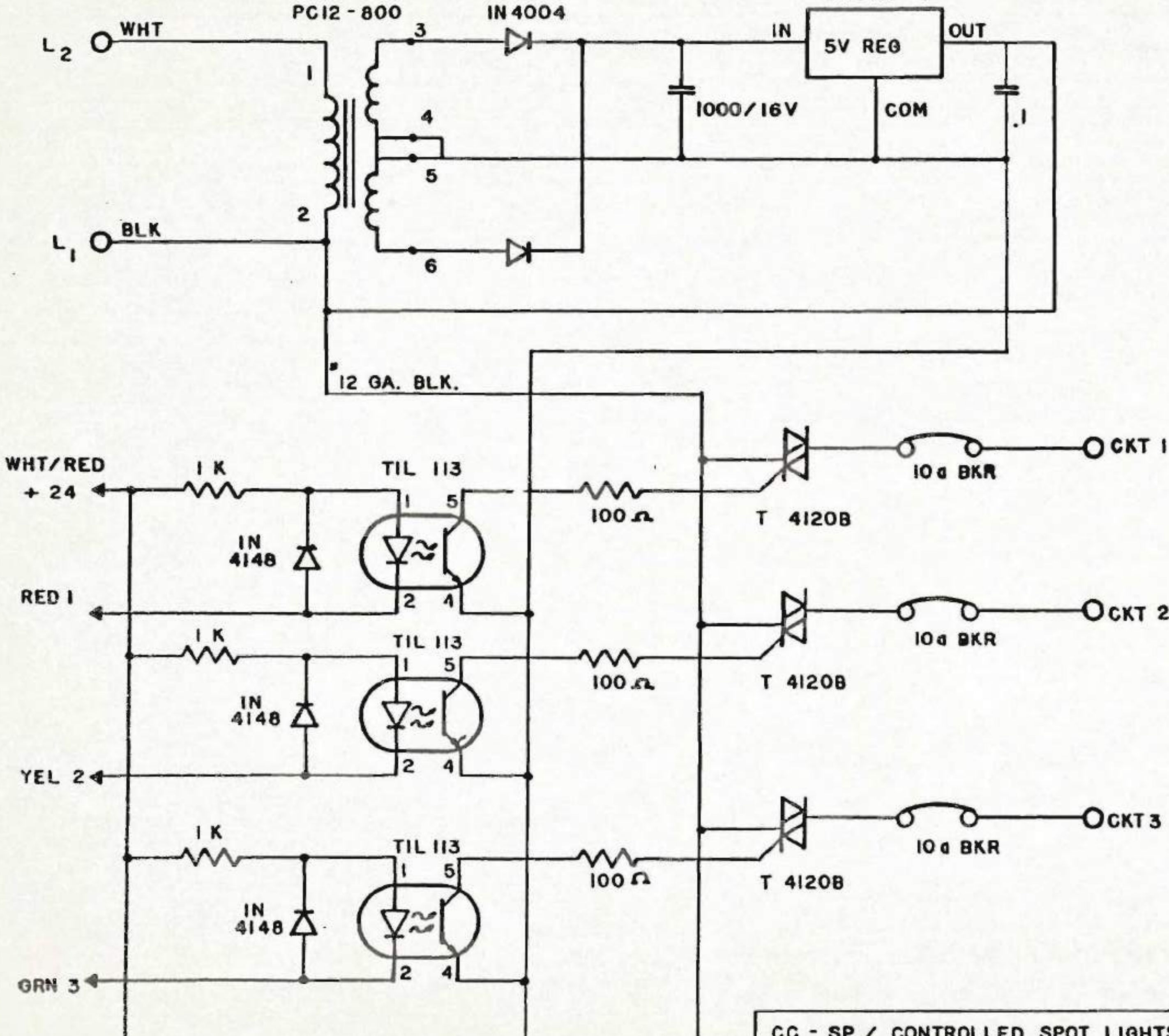
EACH TO BE 15' LONG.

5-065

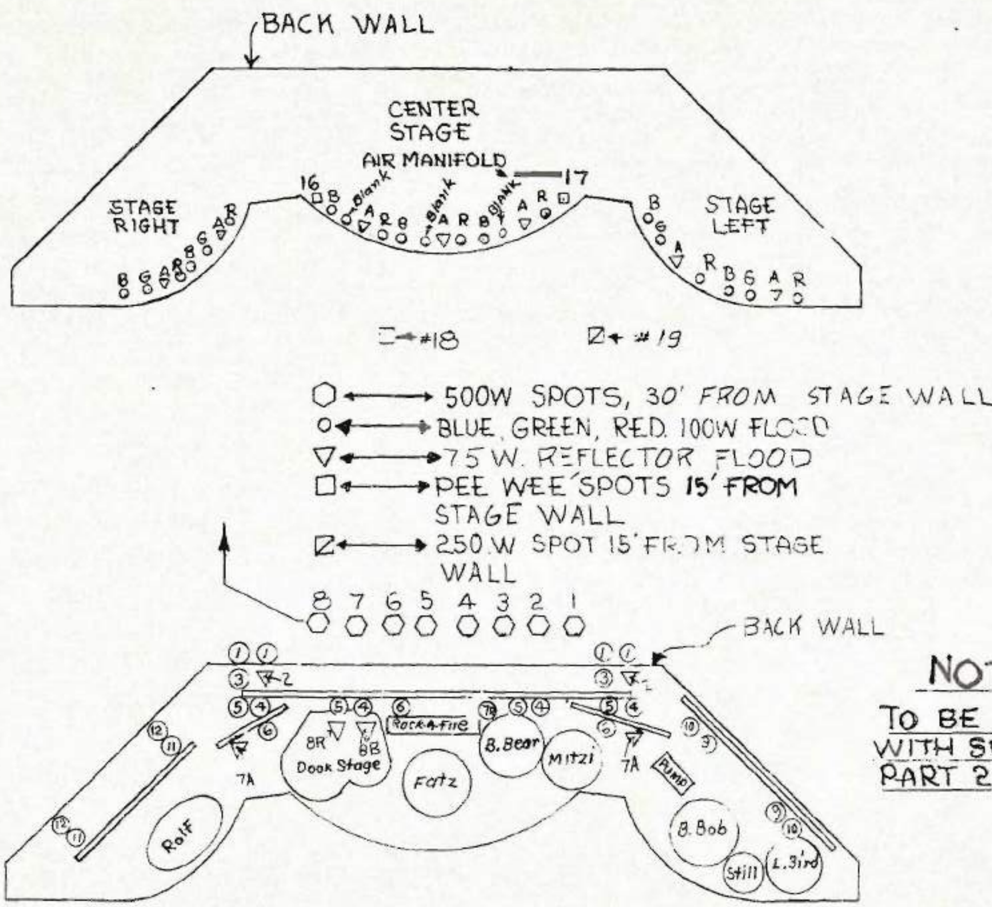
All tol. are Non-accumulative	R.+D. APPROVAL DATE	**CREATIVE ENGINEERING** INC	Property of Creative Engineering, Inc. Reproduction W/O Authorization is strictly prohibited.
	PRODUCTION APP. DATE		
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY CR
REV. DATE BY			DATE: 10-14-83	CHK'D. BY E.D.
	ITEM: CABLE DETAIL FOR CC PANEL			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L:			DRAWING NUMBER

STOCK	MAT'L.

EIGHT CIRCUIT TRIAC DRIVER BOX



CC - SP / CONTROLLED SPOT LIGHTS
CC - CL / CONTROLLED CEILING FLOODS - S.L.
CC - HL / CONTROLLED HOUSE LIGHTS
CC - CS / CONTROLLED CEILING FLOODS - C.S. / S.[illegible]



NOTE

TO BE USED IN CONJUNCTION WITH SPOT LIGHT ADJUSTMENTS: PART 2, SECTION III, STEP C.

STAGE EFFECT LIGHTS

Number Code		Quan
#1 outside Blue	Bit 81	4
#2 Inside Amber	Bit 82	2
#3 Inside Blue	Bit 83	2
#4 Treeline Red	Bit 84	4
#5 Treeline Blue	Bit 85	4
#6 Bushes Green	Bit 86	3
#7 Bushes (Red Amber)	Bit 87	3
#8 Drum's (Red, Blue)	Bit 75	2
#9 Service Station Blue	Bit 92	2
#10 Service Station Red	Bit 93	2
#11 Rainbow Red	Bit 94	2
#12 Rainbow YELLOW	Bit 95	2

STOCK	MAT'L.

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R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL DATE — M.O.

REVISIONS — REV. | DATE | BY

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 9-2-83

DRAWN BY CP

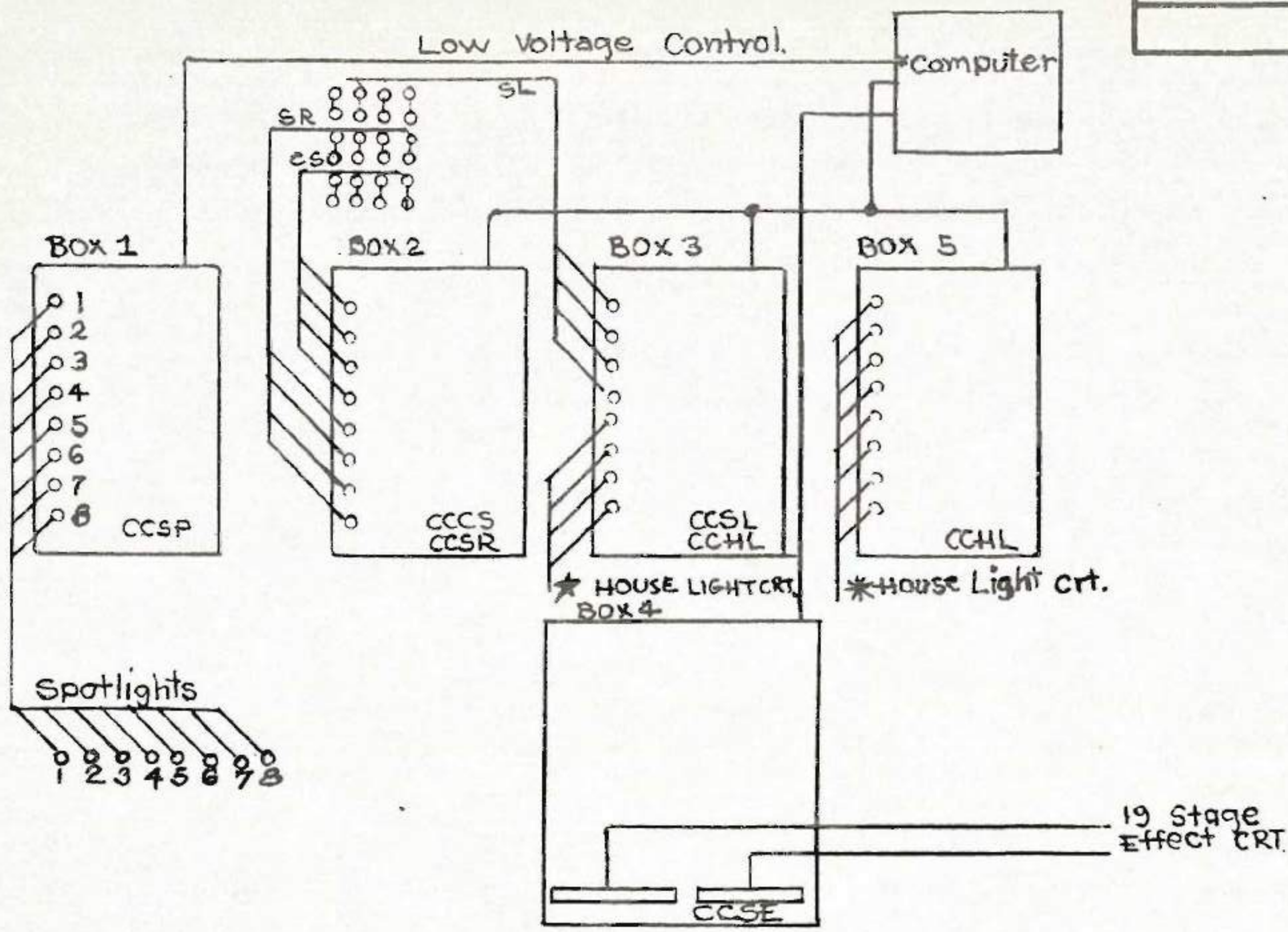
CHK'D. BY

UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .XX ± .010 .XXX ± .005

ITEM: ROCK-AFIRE STAGE LIGHTING PLAN

MAT'L:

DRAWING NUMBER



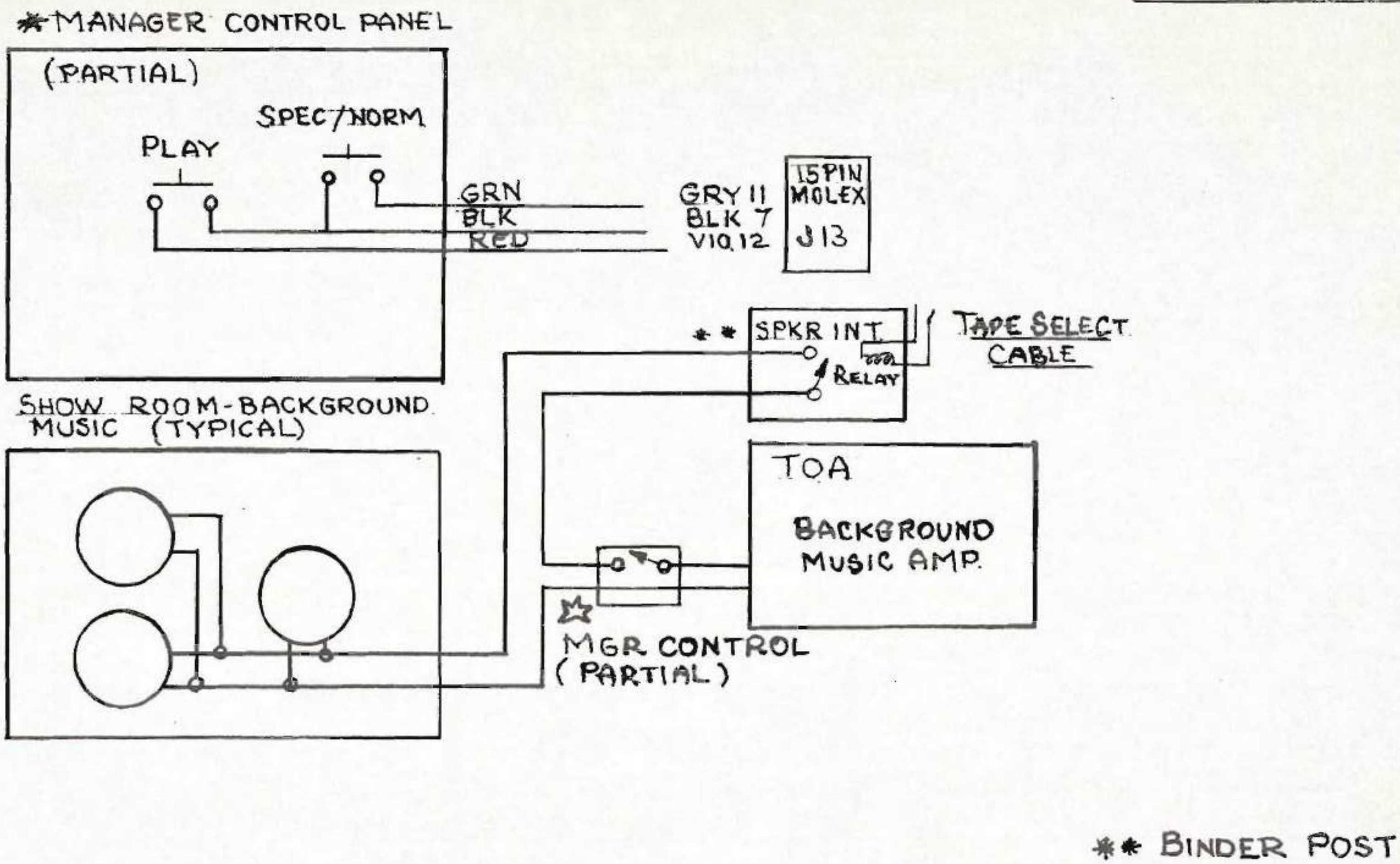
✱ BOX 5 USED IF THERE ARE MORE THAN 4 CIRCUITS IN SHOW ROOM. IN THIS INSTANCE, CIRCUITS 5-8 OF BOX 3 ARE NOT USED.

✱ COMPUTER AND HOUSE LIGHTS TRIAC BOXES AND OVERRIDE SWITCHES MUST BE ON THE SAME PHASE A.C.

5-063

STOCK	MAT'L.

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	PRODUCTION APP. DATE				
REVISIONS	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010	SCALE:	DRAWN BY TR-CR	
REV. / DATE / BY			DATE: 8-22-83	CHK'D. BY AD	
	ITEM: LIGHTING INTERCONNECT CHART			UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005	
	MAT'L:			DRAWING NUMBER	



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REVISIONS

REV.	DATE	BY

R.+D. APPROVAL: MD — DATE:

PRODUCTION APP. — DATE:

Q. C. APPROVAL — DATE:

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DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 9-30-83

DRAWN BY TR-CR

CHK'D. BY D.L.D.

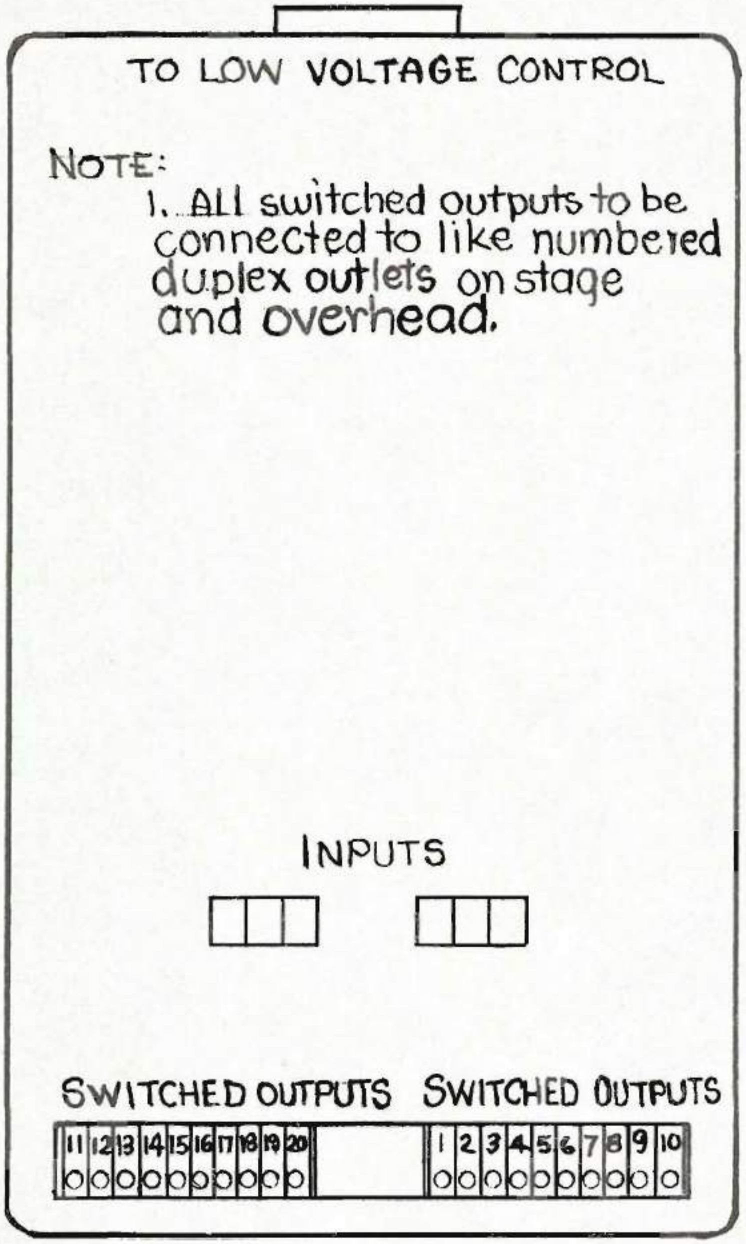
UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .XX ± .010, .XXX ± .005

ITEM: MANAGER CONTROL AND BACKGROUND MUSIC INTERFACE

MAT'L:

DRAWING NUMBER

STOCK | MAT'L.



STOCK | MAT'L.

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REVISIONS		
REV.	DATE	BY

R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL. DATE

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 8-24-83

DRAWN BY TR / CP

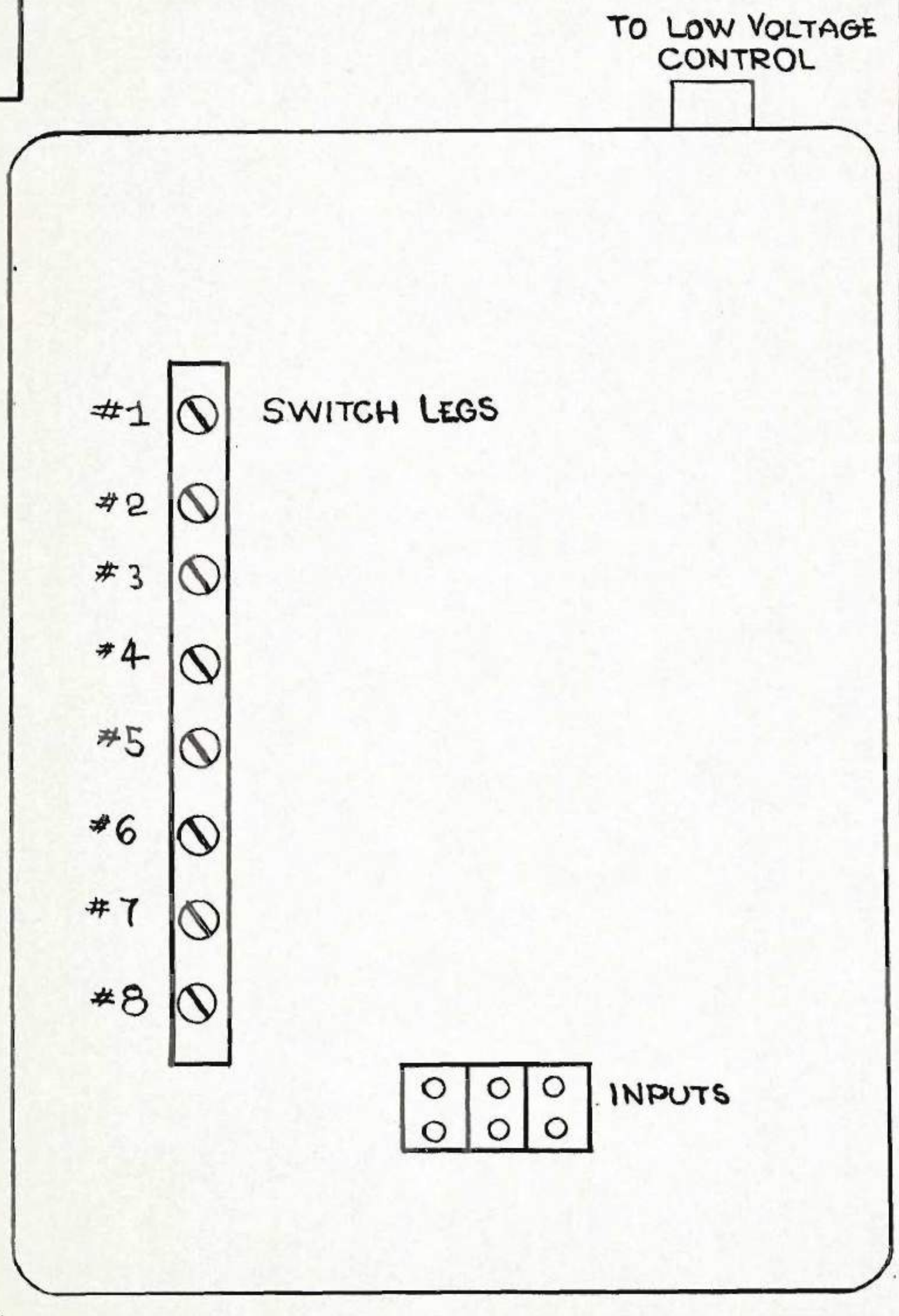
CHK'D. BY

UNTOLERANCED DIM.
FRACT'L. ± .020
DECIMAL .xx ± .010 .xxx ± .005

ITEM: 20 TRIAC DRIVER BOX

MAT'L:

DRAWING NUMBER



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DRAWN BY TR-CR

CHK'D. BY D.S.

UNTOLERANCED DIM. FRACT'L. ± .020 DECIMAL .xx ± .010 .xxx ± .005

DRAWING NUMBER

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE: 8-22-83

R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL DATE

ITEM: 8-TRIAC DRIVER

MAT'L:

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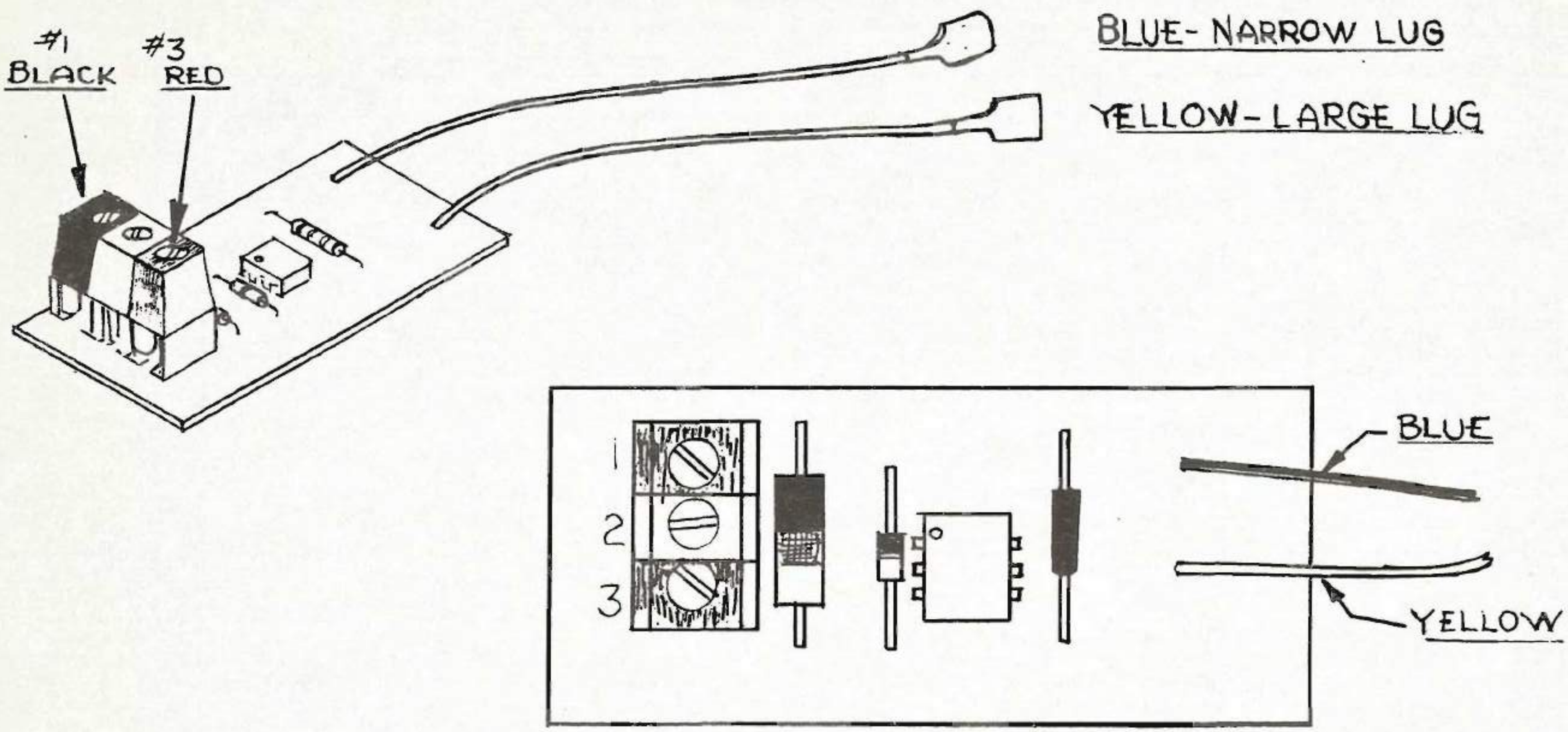
REVISIONS

REV.	DATE	BY

STOCK

MAT'L.

STOCK	MAT'L.



5-072

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R.+D. APPROVAL DATE

PRODUCTION APP. DATE

Q. C. APPROVAL DATE 10-25-82.

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REVISIONS		
REV.	DATE	BY
1	9/26	CR

DEBURR AND BREAK ALL SHARP CORNERS ± .010

SCALE:

DATE:

DRAWN BY Carl R

CHK'D. BY D.Z.D.

ITEM: LIGHT CONTROL MODULE

UNTOLERANCED DIM.
FRACT'L. ± 020
DECIMAL .xx ± .010 .xxx ± .005

MAT'L:

DRAWING NUMBER

```
*********
*       *
* CABLES*
*       *
*********
```

CABLES

1.	Cable #1 (Rolfe & B.Bob) *	
	a. 25'	E18-10200
	b. 50'	E18-10210
2.	Cable #2 (Dook & B.Bear)*	
	a. 28'	E18-10240
	b. 40'	E18-10250
3.	Cable #3 (Fatz)	E18-10220
4.	Cable #4 (Mitzi)	E18-10230
5.	Cable #5 (Props)	E18-10270
6.	Cables #7 (Looney Bird)	E18-10260
7.	Cable (Organ and Sign)	E18-10340
8.	Cable adapter (Y-cable organ and sign)	E18-10350
9.	Cable #9 (curtain #1-old style)	E18-10280
10.	Cable #10 (curtain #2-old style)	E18-10290
11.	Cable #11 (curtain #3-old style)	E18-10300
12.	J-13 Interface Cable	E17-10220
13.	AC monitor cable	E17-10400
14.	Stage/floods control box cable	E9-604
15.	Manager control cable	E18-10900
16.	Spots cable (RAF 100 panel only)	E9-504

CC PANEL CABLES

17.	Cable #13 (Spotlight and curtain output)	E18-10330
18.	Cable #14 (Floodlights)	E18-10360
19.	Cable #15 (Stage)	E18-10370

* Length determined by distance to control room

PANEL L3

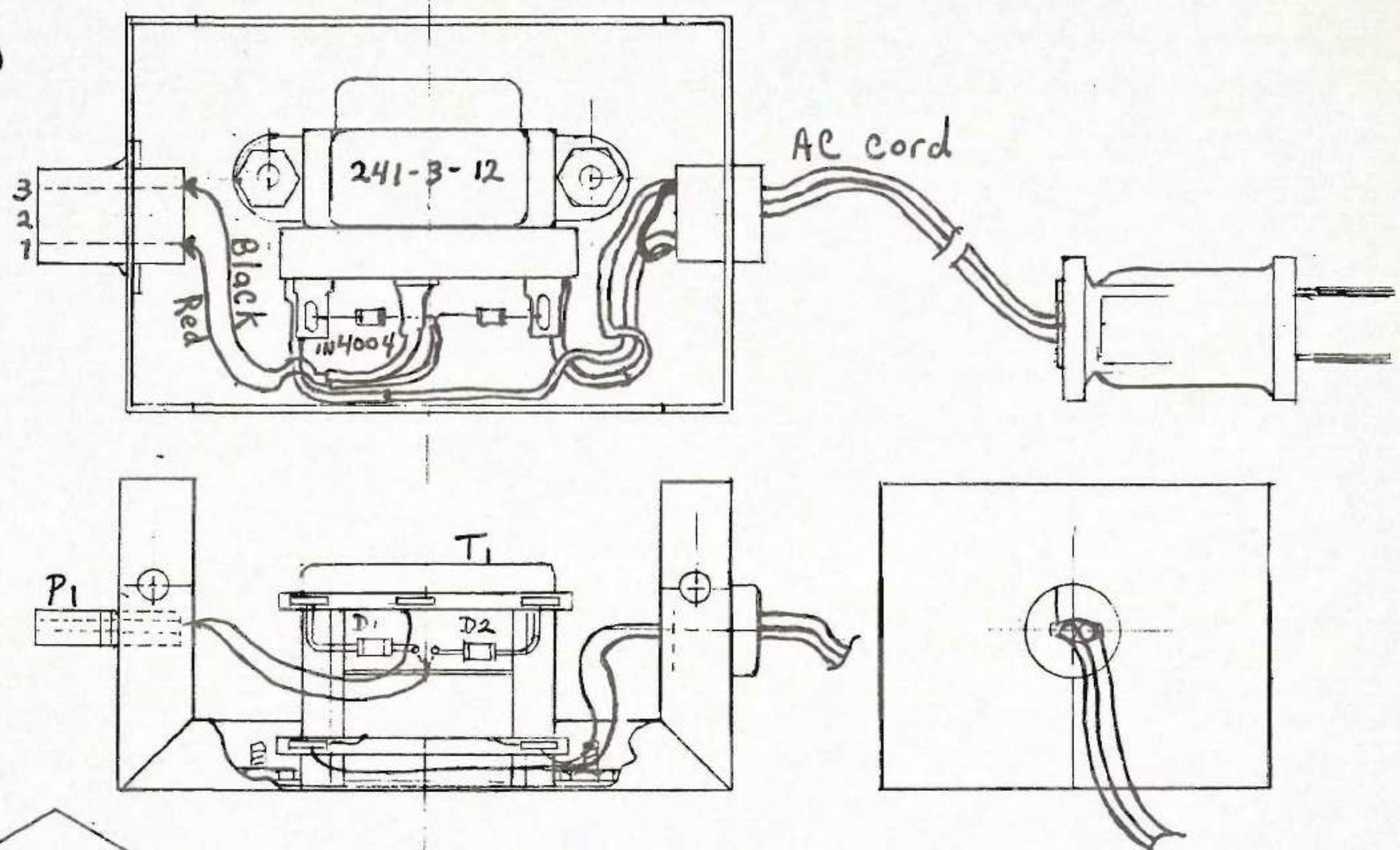
LOAD SERVED	POLE	AMP	CIRCUIT NO.			AMP	POLE	LOAD SERVED
COMPUTER RECEPTACLE	1	20	1	Aø	2	20	1	DINING ROOM EMERGENCY LIGHTS
AUDIO RACK RECEPTACLE	1	20	3	Bø	4	15	1	B1, G1, A1, R1
CURTAIN CONTROL - PLATFORM LEFT	1	20	5	Cø	6	20	1	CURTAIN CONTROL, CENTER PLATFORM
HOUSE LIGHTS #1 (HL1)	1	15	7	Aø	8	15	1	HOUSE LIGHTS #2 (HL2)
SE1, SE2, SE3, SE4, SE5	1	15	9	Bø	10	20	1	CURTAIN CONTROL, PLATFORM RIGHT
SP1	1	15	11	Cø	12	15	1	SP2
HOUSE LIGHTS #3 (HL3)	1	15	13	Aø	14	15	1	HOUSE LIGHTS #4 (HL4)
CONVENIENCE RECEPTACLE, CONTR.	1	20	15	Bø	16	20	1	PLATFORM RECP.; LEFT, CTR., RIGHT
SP3	1	15	17	Cø	18	15	1	SP4
HOUSE LIGHTS #5 (HL5)	1	15	19	Aø	20	15	1	HOUSE LIGHTS #6 (HL6)
DINING ROOM MONITOR RECP'S (2)	1	20	21	Bø	22	15	1	SE6, SE7
CONTROL ROOM LIGHTS	1	20	23	Cø	24	20	1	WORK LIGHTS, PLATFORMS
HOUSE LIGHTS #7 (HL7)	1	15	25	Aø	26	15	1	HOUSE LIGHTS #8 (HL8)
SE8, SE9	1	15	27	Bø	28	15	1	SE10, SE11, SE12
SP5	1	15	29	Cø	30	15	1	SP6
HOUSE LIGHTS #9 (HL9)	1	15	31	Aø	32	15	1	HOUSE LIGHTS #10 (HL10)
SE13, SE14, SE15	1	15	33	Bø	34	15	1	SE16, SE17, SE18
SP7	1	15	35	Cø	36	15	1	SP8
FUTURE	1		37	Aø	38			FUTURE
B2, G2, A2, R2	1	15	39	Bø	40	15	1	B3, G3, A3, R3
SE19, SE20	1	15	41	Cø	42	15	1	CONTROL CCT., HL CONTRACTORS

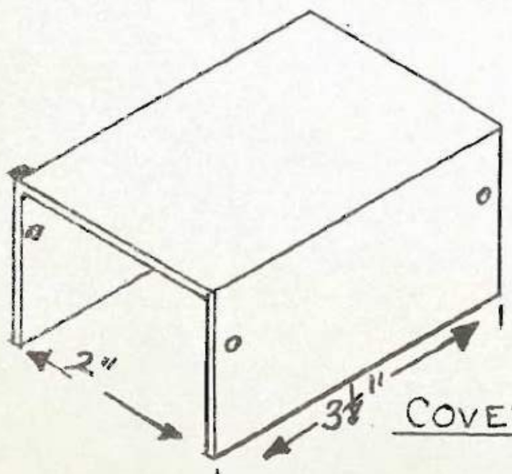
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E3-10020

Parts

Number	
24-030-005	IN4004 Diode
24-105-035	Transformer
24-015-203	Molex (3 Pin)
24-020-005	Line Cord
24-010-002	Bed Box
24-060-135	Strain Relief



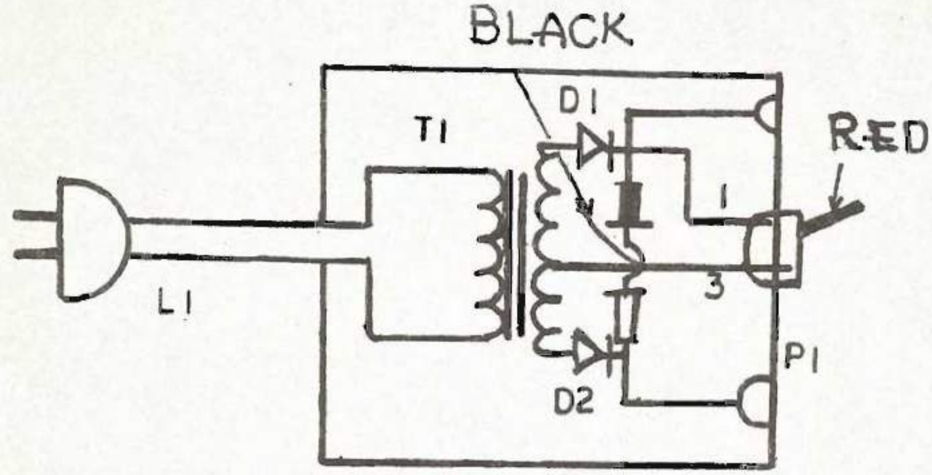


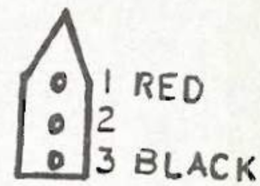
* Sleeving used ON All wire

AC Moniter (Adaptor)

SCALE: FULL	APPROVED BY	DRAWN BY
DATE: 5-13-82		carl R
		DRAWING NUMBER

AC LINE ADAPTOR





PARTS LIST

D1, D2 — IN4002 OR EQUIV.

T1 — SIGNAL 241-3-12

P1 — MOLEX 03-06-1031

L1 — LINE CORD DIGI KEY 256C

BOX — BUD CU-2101B

* NOTE:

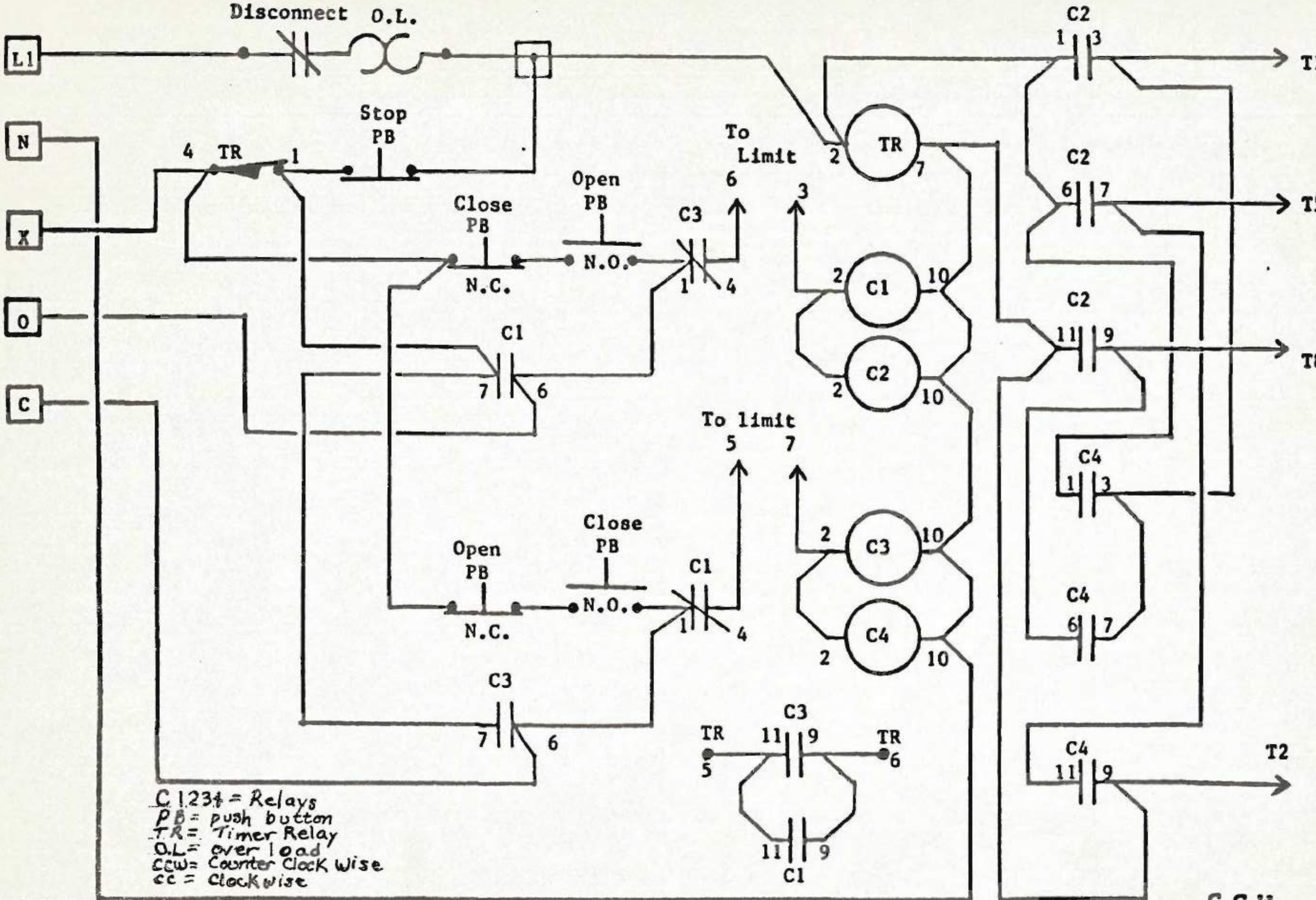
LEAD HEIGHT OF DIODES - 3/8"

BETWEEN DIODES - 3/8"

ADD SLEAVING TO DIODES LEGS

7/14/83

KJ

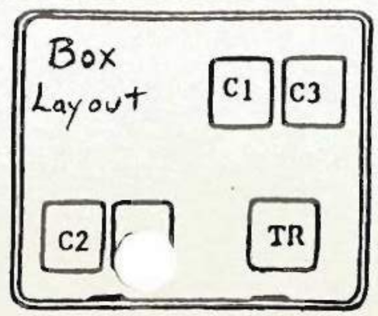


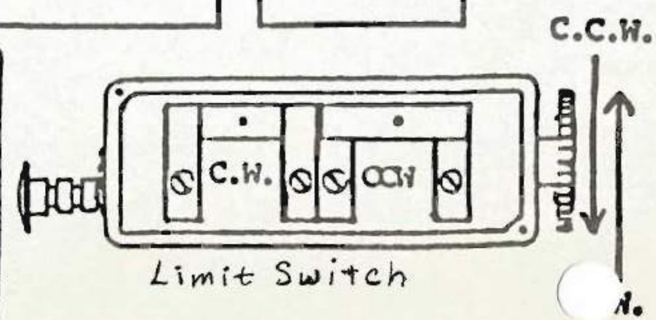
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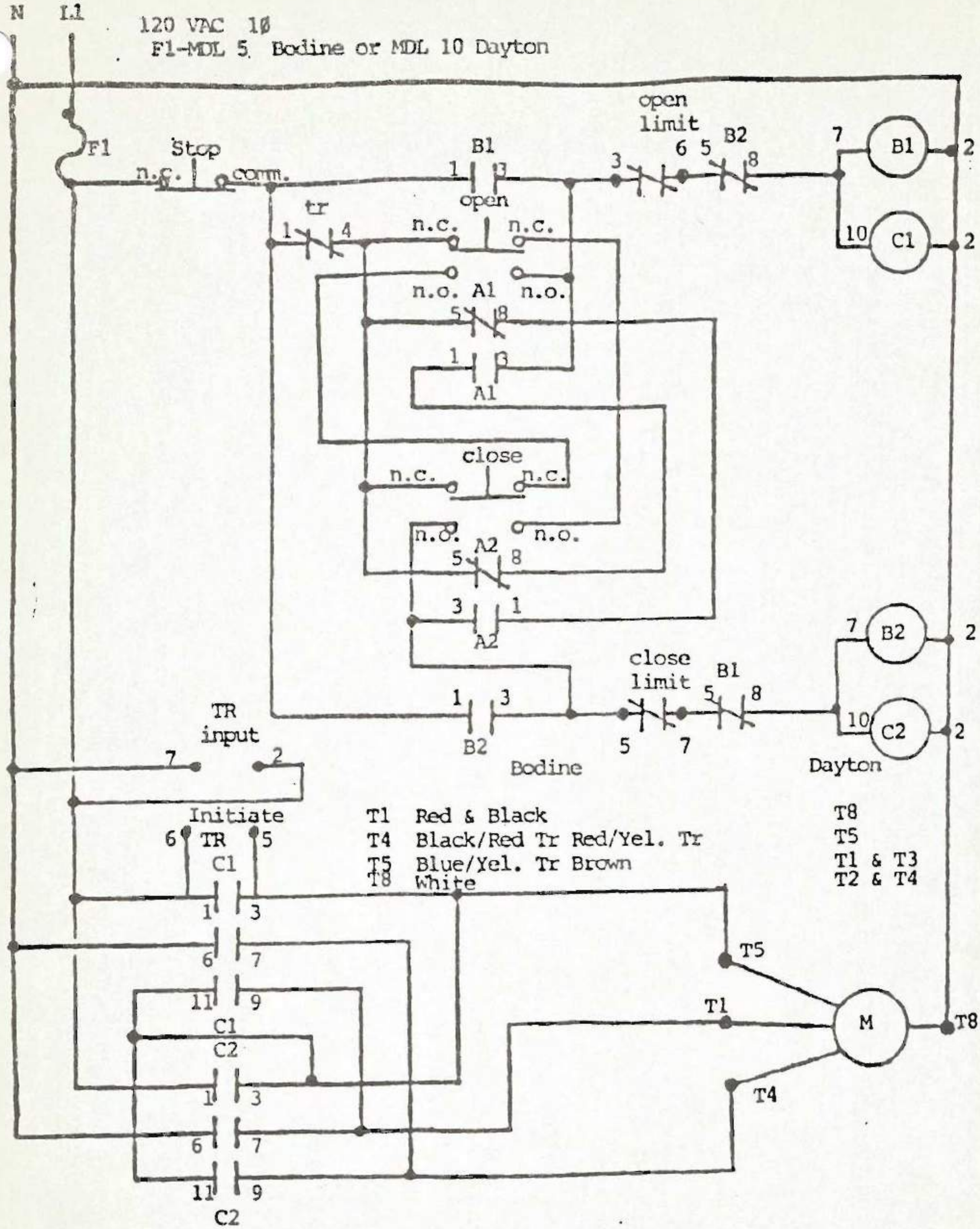
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APPROVED BY	DATE:	DRAWN BY
	DATE	CHK'D. BY D. I. D.

ITEM:
Curt[illegible]n Motor Controls



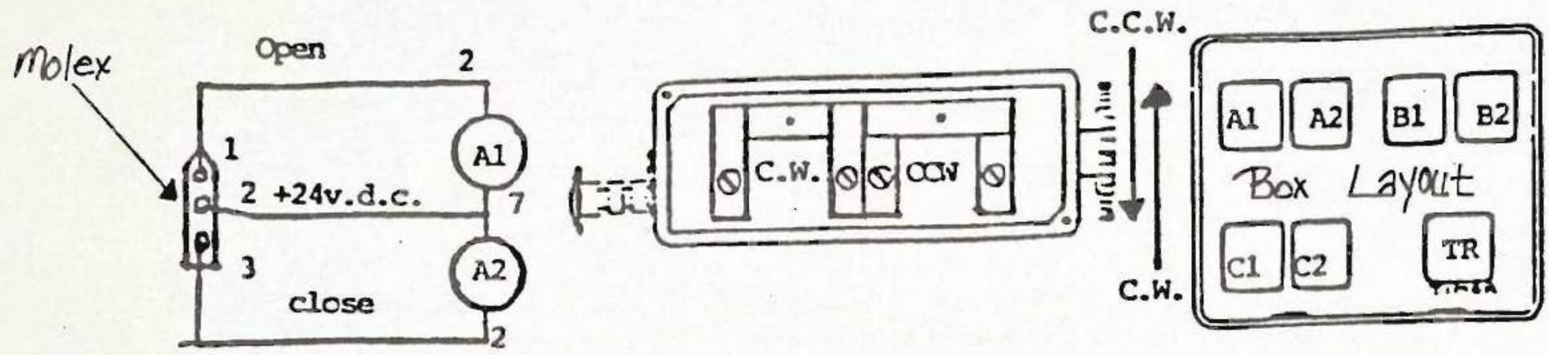




Curtain Motor Control

Pre 1/83 Shows

STOCK	MAT'L.

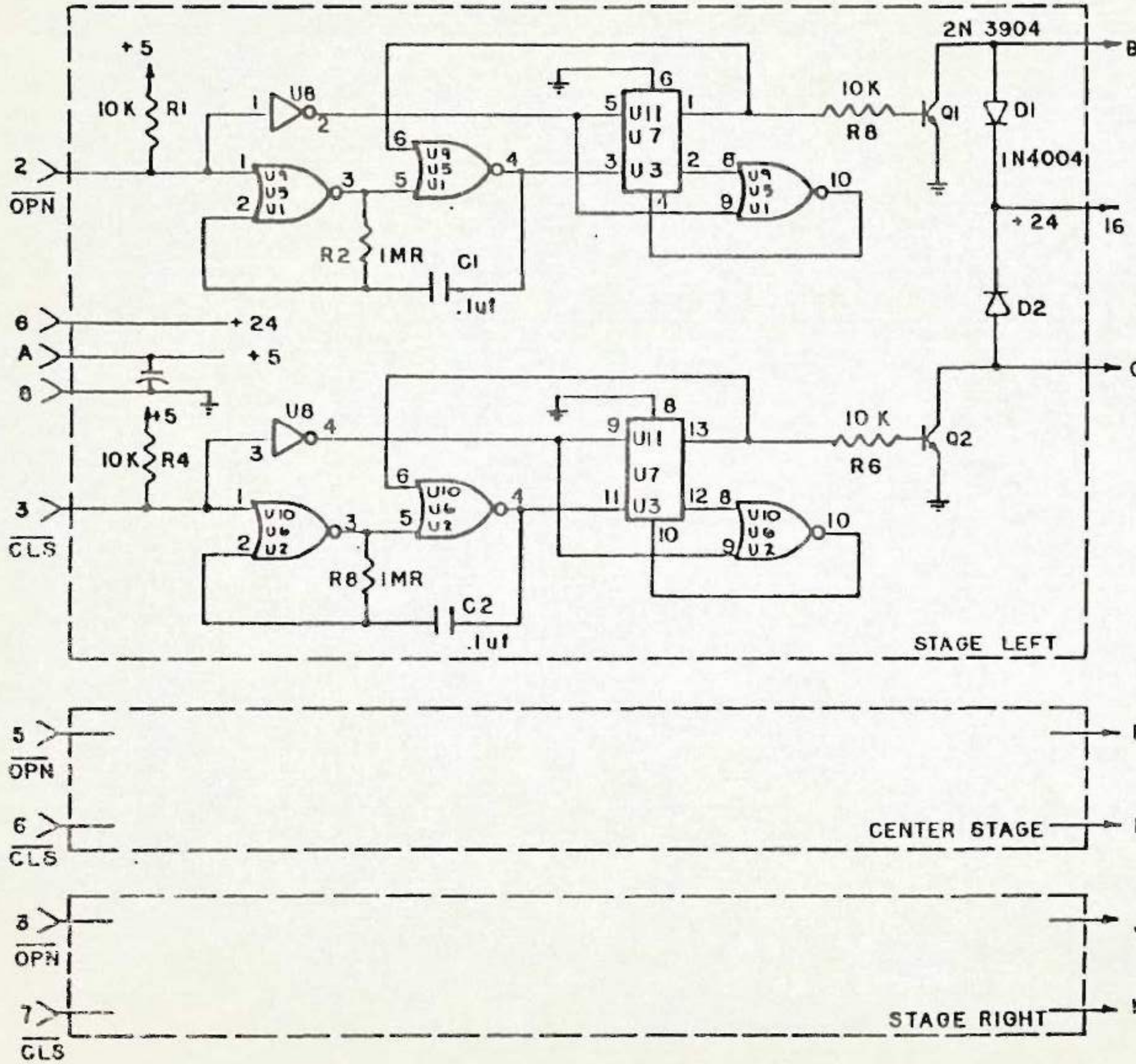


5-079

A1, A2 = Relays
CW = Clockwise
CCW = Counter Clockwise

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	PRODUCTION APP. DATE		
REVISIONS (REV. / DATE / BY)	Q. C. APPROVAL DATE	DEBURR AND BREAK ALL SHARP CORNERS ± .010 / SCALE: / DATE:	DRAWN BY / CHK'D. BY L. L.
	ITEM: Curtain Control Limit Switch		UNTOLERANCED DIM. FRACT'L. ± 020 DECIMAL .xx ± .010 .xxx ± .005
	MAT'L: [illegible]d Layout Pre 1/83 Shows		DRAWING NUMBER

CURTAIN CONTROL BOARD



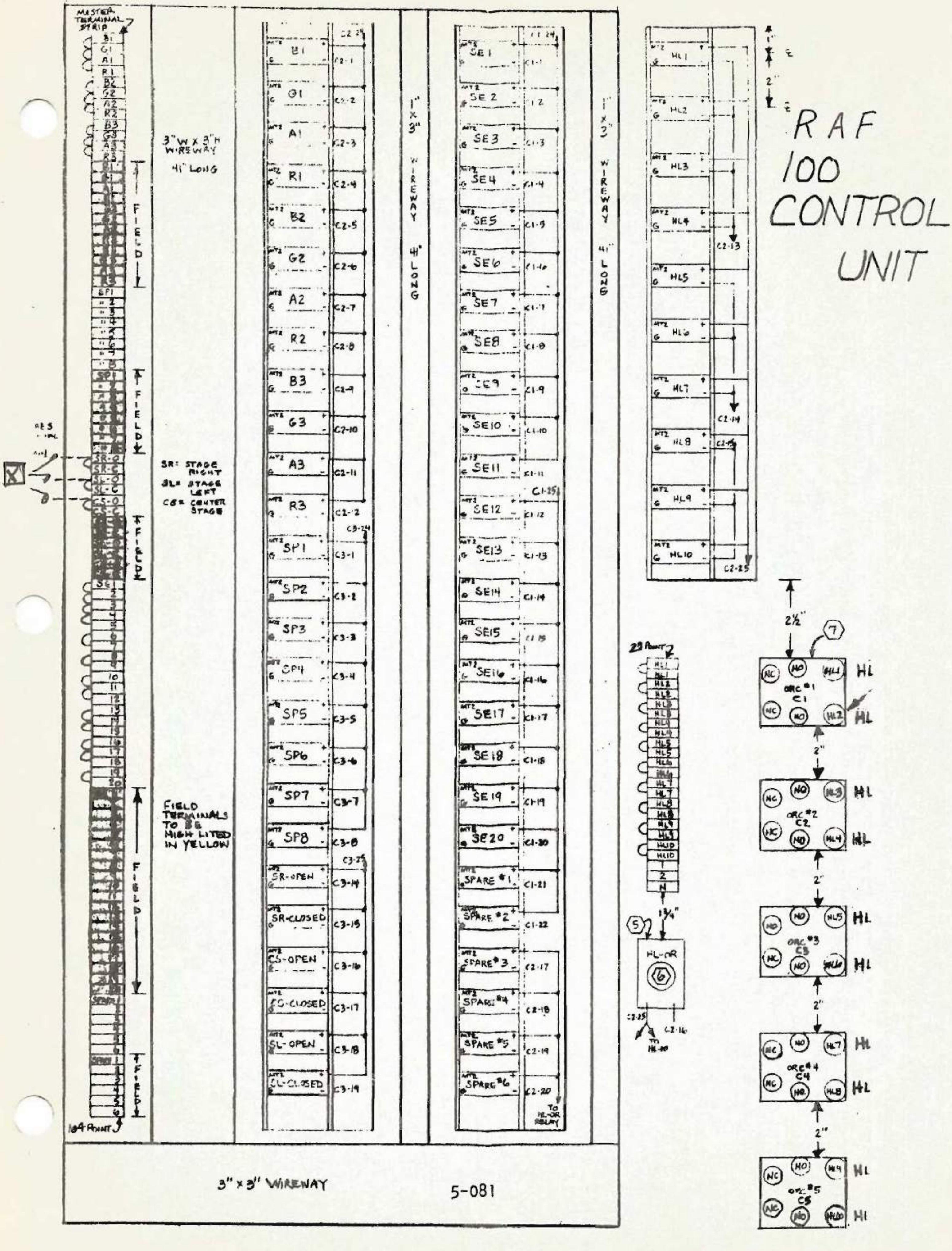
U1,2 - CD 4001
U3 - CD 4013
U8 - CD 4069

Q1,2 - 2N 3904
D1,2 - IN 4002

VCC - PIN 14
GRD - PIN 7

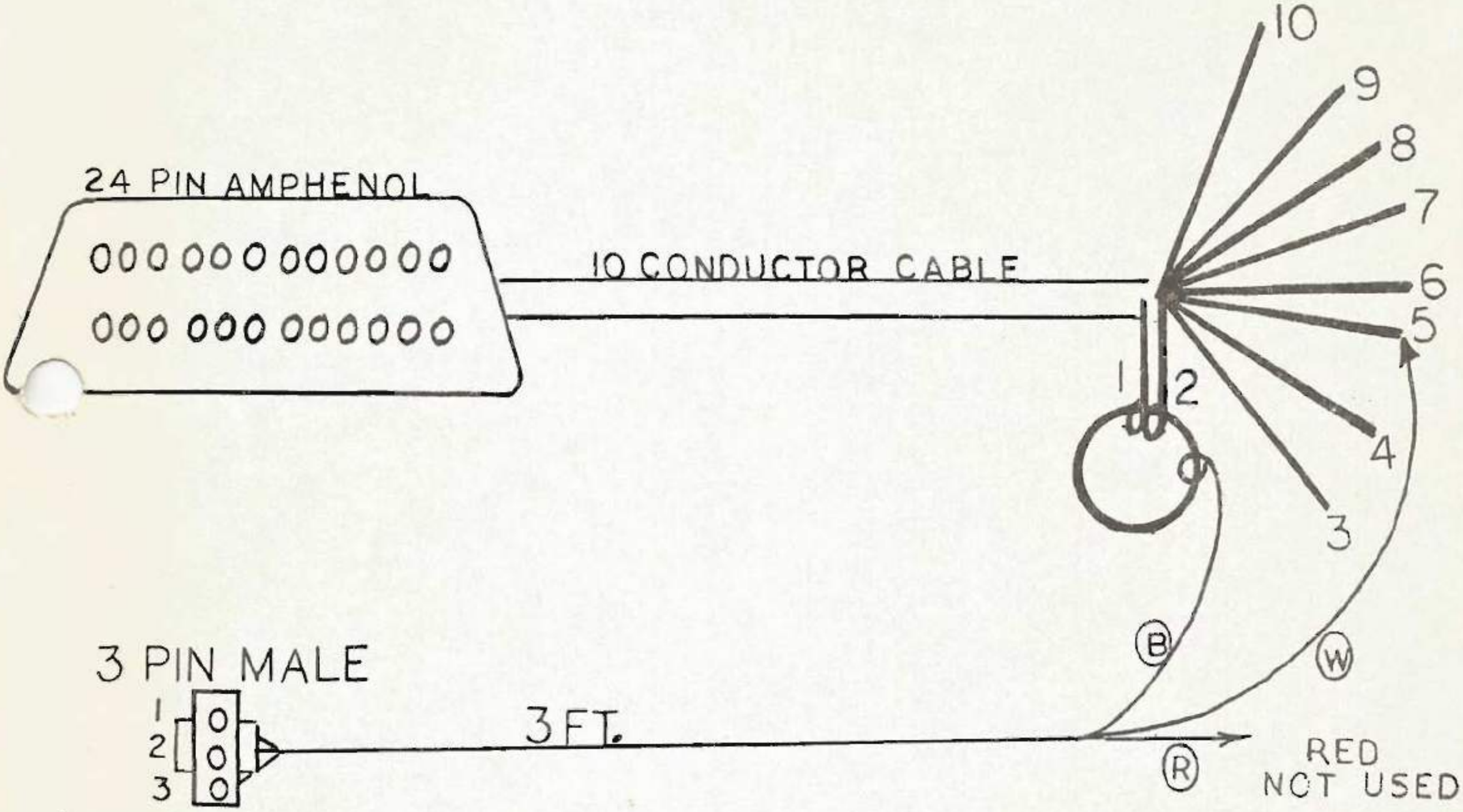
U9,10,11 - STAGE R.
U5,6,7 - CENTER STAGE
U1,2,3 - STAGE L.
U8 - 16 BIT INVERTER - ALL STAGES

RAF 100 CONTROL UNIT



PROPS CABLE MODIFICATION
FOR DUAL PRESSURE

1) BLACK
2) WHITE
3) BLUE
4) RED
5) ORANGE
6) YELLOW
7) GREEN
8) BROWN
9) VIOLET
10) GRAY



1) WHITE
2) RED
3) BLACK

PROCEDURE

ATTACH THE 3 CONDUCTOR CABLE CUT TO 3' LENGTH (DUAL VALVE BANK CABLE) TO THE 10 CONDUCTOR CABLE OF THE PROPS VALVE BANK.

T OFF BOTH WIRES ON #3 VALVE OF VALVE BANK.

7/21/83
KJ